THE REFINER AND NATURAL GASOLINE MANUFACTURER

Annual Buyers' Guide

A complete index of products used in refineries and natural gasoline plants, giving name and address of manufacturer or dealer. A valuable addition to your buying records.

Electricity as Auxiliary Power for Gasoline Plant. By Grady Triplett

Treated Bentonite as Catalytic Agent. Discussion by Joe E. Meyer

Pure Adds Cold Gassing Unit at Cabin Creek. By Clyde D. Moore

Vol. 4 No. 4 APRIL, 1925 $1.00 Per Year

True to Size and Shape

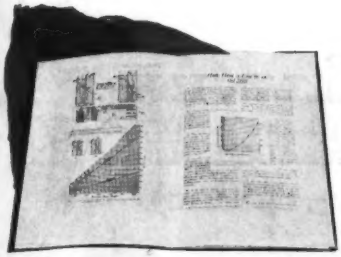
Fuel is being wasted wherever heat gets out of bounds. This waste, because it is invisible, is often unheeded. Yet in the average size refinery it may amount to thousands of dollars within a year.

Every still setting and top, tank, or pre-heater that leaks heat into the surrounding atmosphere is running up needless fuel expense. Insulation of this equipment almost invariably pays for itself in a few months' time.

Sil-O-Cel Brick are Easy to Install *because they are* MACHINED TO SIZE AND SHAPE

Insulating with Sil-O-Cel is always simple to do. Sil-O-Cel Standard and C-22 brick are easy to place in any fire brick construction because they are of fire brick dimensions, always true to size and shape. Equipment already in operation, too, can be readily veneer-insulated with Sil-O-Cel without disturbing the settings.

For tank and still surfaces, especially, Sil-O-Cel is readily the most effective and economical insulation because it provides a uniform, unbroken covering of the most efficient high temperature insulation available.



CELITE PRODUCTS COMPANY

NEW YORK - 11 BROADWAY. CHICAGO - 53 W. JACKSON BLVD.
LOS ANGELES - VAN NUYS BLDG. SAN FRANCISCO - MONADNOCK BLDG.

OFFICES AND WAREHOUSES IN PRINCIPAL CITIES

CELITE PRODUCTS LIMITED, NEW BIRKS BLDG., MONTREAL, CANADA
CELITE PRODUCTS CORPORATION, WINDSOR HOUSE, LONDON, S.W.1, ENGLAND.

The effective insulation of oil refinery equipment is described in detail in a 64-page treatise being distributed by the Celite Products Company. Engineers desiring this valuable data book are requested to apply for it on their business letterhead.

APR 24 1925 LIBRARY

Roots No. 8 Gas Pump in service at Lakehurst, New Jersey used to deflate the Shenandoah. The Helium Gas is taken from the huge bag at the rate of 100,000 cubic feet per hour and then pumped to the holder, 2500 feet away.

Unprejudiced Authorities Specify Roots Gas Pumps

Government engineers specify Roots equipment where service, economy and ability to operate continuously under all conditions are essential.

Refinery engineers are gradually realizing not only these facts but the fact that Roots Gas Pumps mean a great saving in Refinery operation.

In many instances these pumps are pulling the uncondensed gas from the absorbers and on to the power plant as fuel. Out of savings derived from such installation Refineries can pay for their entire recovery system in a few months.

Our Engineers will gladly tell you more about your needs for this equipment.

ROOTS

You should have the following bulletins in your files:

113—Roots Rotary Pumps.

109—Roots Rotary Gas Pumps.

111—Roots Positive Displacement Gas Meters.

118—Engineering Tables.

Just ask the nearest office for them.

The P.H.&F.M. ROOTS CO.

DEPT. 10

CONNERSVILLE, IND.

Chicago Office
130 S. Michigan Ave.

New York Office
Room 800-120 Liberty St.

1576 Union Trust Bldg. Cleveland

JENKINS CRACKING PROCESS

Facts from performance

PRODUCES STABLE GASOLINE

■ ■ ■

Gasoline from the Jenkins Process is stable, either by itself or mixed with straight run gasoline.

During September, 1924

One 10,000 gallon tank was filled with 27 color U. S. Motor Jenkins gasoline, and

One 10,000 gallon tank was filled with 50% of this gasoline and 50% of straight run gasoline, and

On February 12, 1925

Samples from both tanks still tested 27 color.

This Jenkins gasoline was finished within the Process, except for the usual doctor treatment.

GRAVER Corporation Founded 1857

EAST CHICAGO, INDIANA

NEW YORK Grand Cent. Term. | CHICAGO Steger Building | TULSA Atlas Life Bldg. | HOUSTON West Building

Any office can give you complete information

Tell them where you saw the ad

received Like Ours

MATHIESON Chemicals

Mathieson Hypochlorite Process and Mathieson Chemicals

THE Mathieson Hypochlorite Process is steadily gaining favor among oil refiners and is now in successful operation in a number of plants throughout the United States.

The refining of gasoline and kerosene with Hypochlorite involves no expensive changes or additions to existing equipment and shows many distinct advantages over the long-established acid-alkali treatment. The Hypochlorite of Lime solution, which is made up at the refinery from liquid chlorine, presents no difficulties in its preparation or in its final disposal after use.

Our extensive facilities for the production and transportation of Liquid Chlorine enable us to give the best of service to all refiners using our process. We also produce and market direct to the petroleum industry the following standard chemicals: Caustic Soda, in solid form and in tank cars of liquid solution of any desired strength up to 50% Sodium Hydroxide; Bicarbonate of Soda, for all foam type fire extinguishers; Bleaching Powder, sometimes used in making up hypochlorite solutions; Soda Ash, Anhydrous Ammonia and Aqua Ammonia. Quotations and shipping points gladly given on request.

The MATHIESON ALKALI WORKS Inc.
250 PARK AVE. NEW YORK CITY
PHILADELPHIA CHICAGO PROVIDENCE CHARLOTTE

Caustic Soda ~ Liquid Chlorine
Bicarbonate of Soda
Anhydrous Ammonia

EAGLE THISTLE PRODUCTS

Soda Ash ~ Bleaching Powder
Modified Virginia Soda
Aqua Ammonia

Deal Direct with the Manufacturer

Tell them where you saw the ad

Still Another Bessemer Leader—the
BESSEMER DIESEL

AGAIN Bessemer confirms its 28 years of leadership in Oil Field Equipment, this time with a perfected Diesel Engine for Oil Industry service.

Years of internal combustion engine experience and thorough Diesel engine research have resulted in a masterpiece of Diesel engine design and construction—a power source exceptional in its simplicity, economy and ruggedness.

The Bessemer Diesel is not an experiment, it is an engine which has been thoroughly proved by the toughest service in widely diversified uses. Hundreds of horsepower of these engines have given positive proof of their dependability and economy in extended service for the Oil Industry, Municipalities, Industrial plants and Marine users.

This newest addition to the Bessemer line of "Better Oil Field Equipment" embodies the utmost in engineering skill. It employs solid injection of fuel oil resulting in safety and fuel economy, while the many refinements in Diesel engine construction and the usual high Bessemer standard of quality materials make the Bessemer Diesel Engine an unequalled unit for all heavy-duty power requirements of from 50 H. P. to 1000 H. P.

Write for complete engineering details and descriptive catalogue

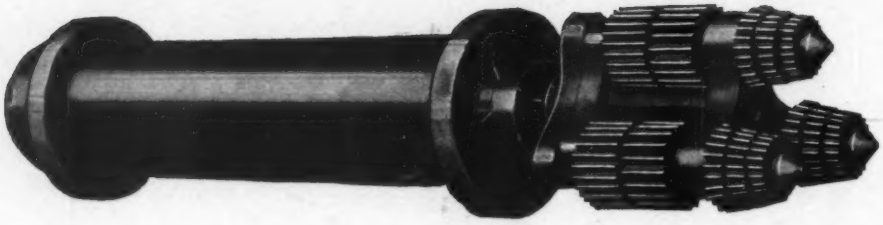
THE BESSEMER GAS ENGINE COMPANY
18 York Street Grove City, Pa.

BESSEMER

BESSEMER OIL FIELD ENGINES – COMPRESSORS VACUUM PUMPS – ROLLER PUMPING POWERS

Tell them where you saw the ad

LIBERTY



In Pressure Stills, Cleanliness Means Efficiency.

The hard coke deposit which forms in Pressure Still tubes is disastrous to economy. It is easy to understand how this heat insulating layer affects the transfer of heat through the tube walls. Oil Refinery men have found it necessary to clean tubes after each run.

For this service, Liberty Cleaners have been eminently successful. The Tandemtype motor, using the rugged and simple type "SF" Head (illustrated above) has been specially designed with the needs of the Oil Refinery in mind. This tool gives fast, durable service, with extremely low maintenance cost. It is the right tool for this work.

Write for our Catalog Z-1 and information regarding cleaners for your particular service.

LIBERTY MANUFACTURING CO.

449 Grant Street PITTSBURGH, PA.

Z-998

CLEANERS

Tell them where you saw the ad

YOU CAN *always* DEPEND ON "WESTERN"

Site of Municipal Gas Plant, Long Beach, California, Capacity 15,000,000 cu. ft. per day. Power equipment: 10-160 H. P. "Western" Duplex Gas Engines and 2-25 H. P. "Western" Single Cylinder Gas Engines.

The City of Long Beach recently decided to build a Municipal Gas Plant to handle fifteen million cubic feet of gas per day. They undertook to complete the plant within forty-five 8-hour days—considerable speed. Ten 160 H.P. "Western" Duplex Engines, and two 25 H.P. "Western" Gas Engines were specified to handle this 15,000,000 cu. ft. of gas. The point we want to emphasize is that shown by the photograph —the 12 "Western" Engines on the job, ready to go, as soon as the foundations were ready. Again "Western" has done its bit efficiently, satisfactorily.

You can ALWAYS depend upon "Western" and "Western" Engines. Thousands of horsepower in the oil fields of the world daily are adding to the worldwide "Western" reputation for Efficient, Dependable Power; and to their owners' general satisfaction.

Write for catalog, records of costs, etc.

Western Machinery Company

General Offices and Factory:
903 N. Main Street Los Angeles, California

San Francisco Office and Factory:
18th and Alabama Streets.

720 So. Kenosha St., Tulsa, Okla.

1106 Nineteenth St., Bakersfiield, Calif.

HILLS-McCANNA NO. 45

A BRONZE WITH THE STRENGTH OF STEEL

Anything that can be Cast or Forged can be made of HILLS-McCANNA-45

USED UNIVERSALLY

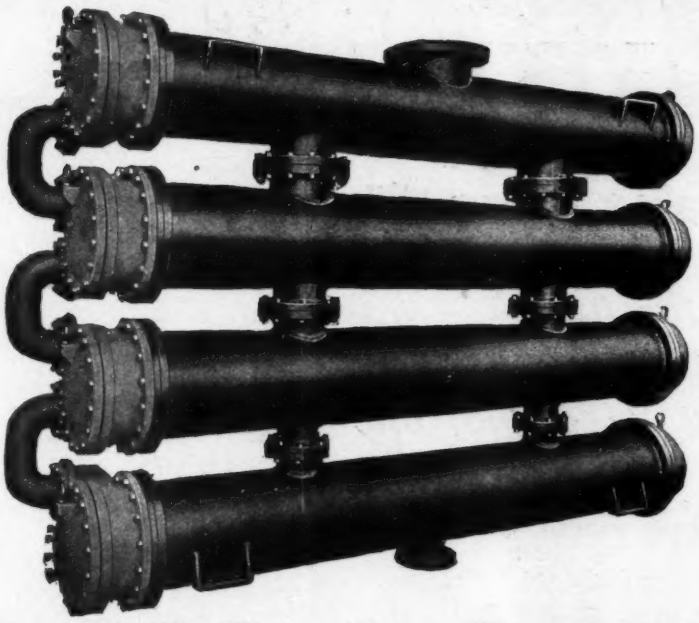
for
STILL PLUGS
THERMOMETER WELLS
PYROMETER PROTECTION TUBES
VALVES and TRIMMINGS
PUMP VALVES-RODS-
RELINERS-PISTON RINGS
CONDENSER BOX NIPPLES
FITTINGS

or for any Parts where Excessive Wear or Corrosion is a Factor

HILLS-McCANNA CO.
2025 Elston Ave. - - CHICAGO

Flexible—

to every service requirement



The G-R Gasoline Condenser

is flexible in purpose, flexible in capacity, and flexible in meeting changing plant conditions.

It can be used either as a natural gas gasoline condenser or as a knockout box or fractionating tower control section.

It can be adapted quickly to small or large capacities as desired.

It can be readily taken apart, transported and reassembled in any desired location to meet changing conditions.

The G-R Gasoline Condenser is so flexible because of its sectional construction, which also makes it compact, easy to erect, easy to inspect and clean, and capable of highly efficient operation.

The complete description and service advantages of this condenser are concisely outlined in Form 210.

Send the Coupon for Complete Information

THE GRISCOM-RUSSELL COMPANY

2135 West Street Building, New York

Philadelphia	Chicago	St. Louis	San Francisco
Boston	Columbus	Kansas City	Los Angeles
Rochester	Indianapolis	Charlotte	Seattle
Pittsburgh	Detroit	New Orleans	Denver
Cleveland	Milwaukee	Houston	Salt Lake City
	Minneapolis	Dallas	Tulsa

For Canada: Riley Engineering and Supply Company, Ltd., Toronto

Griscom-Russell

Heat Transfer Apparatus

Note these other G-R units for lower refining costs

G-R Sectional Condenser

For condensing hydrocarbon vapors and other vapors. Can be used either as standard or reflux condenser. The sectional arrangement permits using as a condenser and heat exchanger in one set or to obtain a different cut from each section. Described in Form 198.

Mineral Seal Oil Heat Exchanger

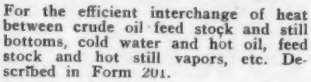
A compact, twin exchanger with strict counter-current flow to promote maximum rate of heat interchange. Described in Form 207.

G-R Vaneflo Gas Cooler

For cooling casing head or natural gas. Can be used as inter-, after- or precooler in absorption and compression type natural gasoline plants. Has low pressure loss and exceptional efficiency. Described in Form 208.

G-R Jacket Water Cooler

Uses any source of raw water to cool the jacket water from oil and gas engines and compressors. The famous Multiwhirl Cooler—over 2000 in operation in every liquid cooling service. Described in Form 209.



G-R Twin Heat Exchanger

For the efficient interchange of heat between crude oil feed stock and still bottoms, cold water and hot oil, feed stock and hot still vapors, etc. Described in Form 201.

The Griscom-Russell Company,
2135 West Street Bldg, New York

Please send information on

- ☐ Gasoline Condenser
- ☐ Sectional Condenser
- ☐ Mineral Seal Oil Heat Exchanger
- ☐ Vaneflo Gas Cooler
- ☐ Jacket Water Cooler
- ☐ Twin Heat Exchanger

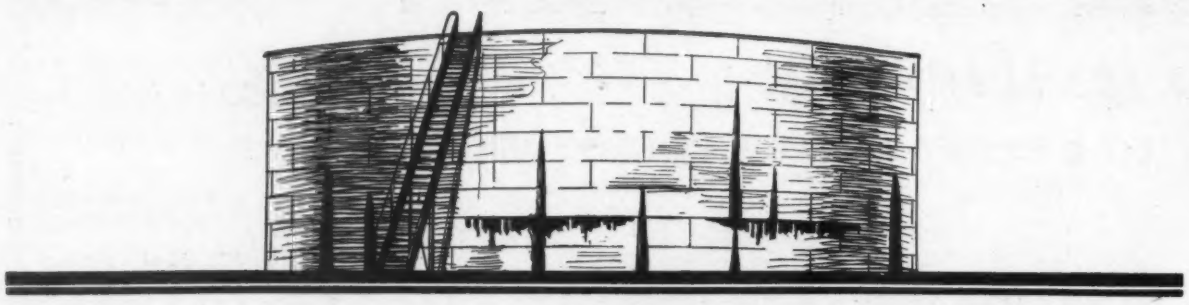
Name . . . . . .

Address . . . . . .

. . . . . .

. . . . . .

R 4-25



Why Stop Leaks Like These?

If you allow the oil (really gasoline) to evaporate through unprotected roof openings?

ANY unprotected tank openings including old style gauge and thief holes or roof manholes permit evaporation of valuable products.

Free vents, in particular, are among the chief offenders.

Losses through the openings differ only from those due to a LEAKING tank in that you CANNOT SEE the evaporation loss.

Could it be seen like a stream of oil pouring through a crevice the tremendous waste would arouse any owner to immediate action.

OCECO Equipment has saved oil companies thousands of dollars both by checking evaporation losses and by reducing insurance premiums because of the protection it offers against fire.

This equipment is designed by men of practical oil field experience with a full knowledge of the conditions it must meet. Then it is built to exactly meet these specific needs. And before placed on the market, it is submitted to the Underwriters' Laboratories for testing and approval.

We shall be glad to consult with you on your storage problems both in regard to checking evaporation loss and reductions on your insurance premiums—this without any obligation on your part.

OCECO Equipment

Gauge and Thief Hole Covers
Roof Manholes
Safety Tank Winches
Cable Sheave Brackets
Tank Nozzles
Breather Valves
Flame Arrestors
Fire Extinguishers

The Oil Conservation Engineering Co.

Headquarters for Tank Equipment
Addison Road and N. Y. C. Tracks
CLEVELAND, OHIO

25 Broadway	New York
325 Iowa Building	Tulsa, Okla.
809 Texas National Bank Bldg.	Fort Worth, Texas
306 O-S Building	Casper, Wyo.

Beaumont Export and Import Company:
Beaumont, Texas and Tampico, Mexico

OIL TANK OCECO EQUIPMENT
SAVES EVAPORATION AND PREVENTS FIRE

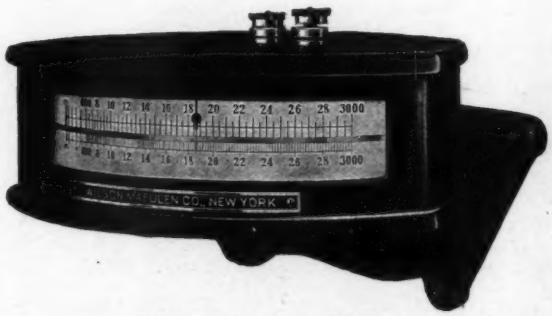
ELECTRIC PYROMETERS for high temperatures
ELECTRIC THERMOMETERS for low temperatures

The accurate and dependable way to measure temperatures in any refinery is with the ELECTRIC THERMOCOUPLE, or the ELECTRIC RESISTANCE-BULB THERMOMETER. Such equipment is **durable** and **sensitive** and **continuously accurate.**

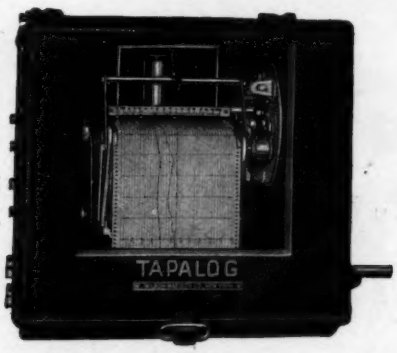
We have made industrial temperture measuring apparatus for 19 years—every bit of it **electrical.**

Thousands of industrial plants use Wilson-Maeulen Electrical temperature measuring apparatus under all sorts of trying conditions.

Indicator and Switch Panel of resistance-bulb Thermometer.

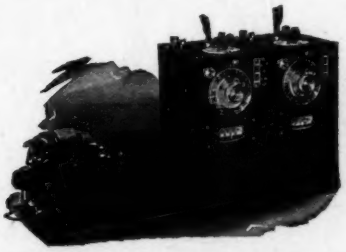


Pyrometer Indicator for use with Thermocouples



The Tapalog records in one or several colors the temperatures at one or several points where are located either resistance-bulbs or thermocouples, whichever is best adapted to the temperature ranges at those points.

Dust and Fume Proof Switch with spindle through packed stuffing box

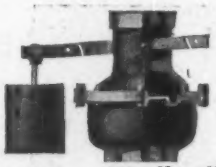


Automatic temperature controller of the thermometer or pyrometer type, with one motor operating from one to six controllers.

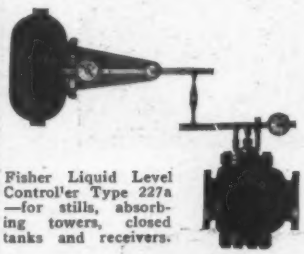
WILSON-MAEULEN COMPANY INC

739 St. Mary's Street, New York

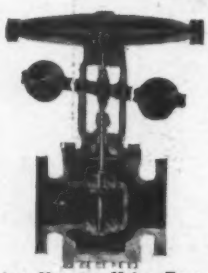
Refinery Service Demands Unusually Efficient Specialties



Fisher Vacuum Valve No. 1515-V Designed to protect low-pressure stills.



Fisher Liquid Level Controller Type 227a —for stills, absorbing towers, closed tanks and receivers.



Fisher Vacuum Valve Type 88 —Protects storage tanks from excess vacuum.

Fisher Diaphragm Actuated Relief Valve Type 505 — For installations on weathering tanks and other places where high-class relief valves are required.

Fisher Has Dedicated Itself to Furnishing Them

We recommend Fisher Specialties for refinery service because of the remarkable records they have made.

Scientifically designed, honestly built, and carefully inspected at all stages of manufacture, they are known wherever specialties are used for their absolute dependability.

Every man in the Fisher organization is charged with the responsibility of doing his part to make each Fisher product live up to the reputation that this famous family of specialties has acquired.

By standardizing on Fisher Specialties, you assure yourself of efficient, economical and trouble-free service.

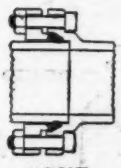
On request we will gladly send you bulletins describing Fisher Specialties adapted to refinery work.

THE FISHER GOVERNOR CO.

Dependable Specialties

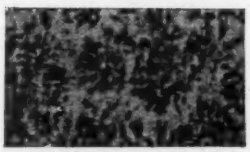
1300 Fisher Ave. **Marshalltown, Iowa**

SIMPLEX CAST IRON CONDENSER PIPING

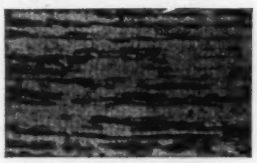


"ONE FLANGE IS LOOSE"

COATS ITSELF



Photomicrograph of cast iron, much enlarged, showing granular structure.



Photomicrograph of wrought iron, much enlarged, showing fibrous structure.

A piece of sheet steel, much enlarged, showing surface and sectional structure with a typical pit.

AUTHENTIC data from over 250 years of service prove that cast iron becomes coated with rust but remains practically unimpaired in weight and strength under conditions that are fatal to other kinds of metal.

Scientists believe this phenomena due to the microscopic structure of cast iron—a structure of the same granular or crystalline form as found in the iron ore from which it is made and which has laid unimpaired in the ground for untold centuries. Cast iron rusts on the surface, but the corrosive agent fails to break the natural mechanical bond between the irregular shaped granules, further oxygen is excluded by the first rust coating, and therefore corrosion stops. Cast iron literally coats itself.

In place of the interlocked grains or crystals of cast iron, wrought iron and steel are of a fibrous and, in thinly rolled steel, of a laminated structure, with distinct leaves overlapping each other. As corrosion takes place, these leaves or fibres scale off, constantly presenting a fresh surface to the corrosive agent.

Simplex pipe is flanged pipe minus the limitations of a joint made with rigid flanges. Thousands of feet of this material has been in use for years by the leading oil refineries of the United States for oil condensers.

Write for Simplex Condenser Catalog Number 55

AMERICAN CAST IRON PIPE COMPANY

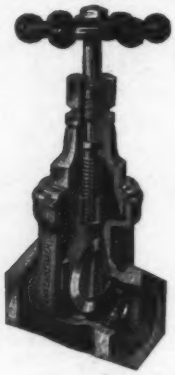
General Offices and Foundry: Birmingham, Ala.

Branches at
Dallas, Kansas City, San Francisco, Los Angeles, Chicago, New York,

Write Also for information on Our Prepared Joint Cast Iron Pipe for Oil Lines

LUNKENHEIMER Gate Valves

Iron Body
Up to 250 lbs. W. S. P.



Bronze
Up to 300 lbs. W. S. P.

Steel
400, 600 and 900 lbs. W. S. P.

IN the refineries and natural gasoline plants every effort is being made to effect greater savings through adoption of methods that will serve economic ends.

Lunkenheimer Valves are playing an important part in reducing the cost of producing crude oil and gasoline. Day after day they perform their duty efficiently, without costly delays due to frequent repairs and replacements. Once installed they require little attention; their long life and low maintenance cost make them the most inexpensive valve in the end.

All parts of Lunkenheimer Valves, including seats and discs, are renewable, a feature which materially prolongs the life of the valves.

Lunkenheimer Distributors, in all commercial centers, have the facilities for rendering prompt service. Call on them for your requirements.

The Lunkenheimer "Guide to Better Service" makes it easy to choose the right valves for any service pressure or temperature. It will be a valuable addition to your files, and you may have a copy free.

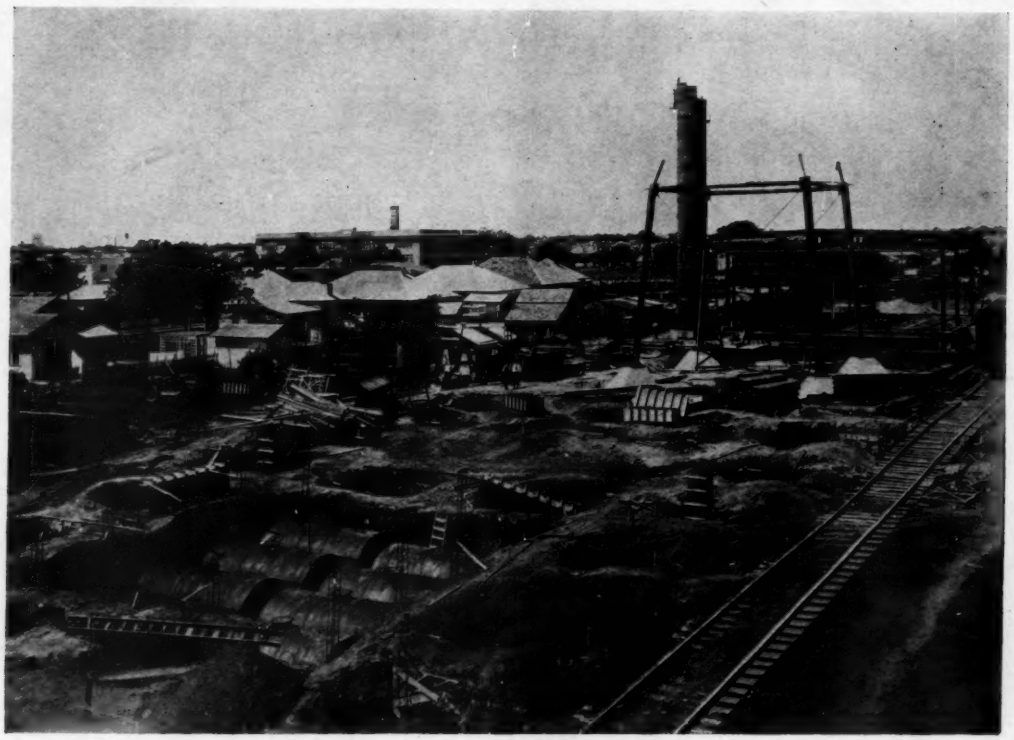
Just fill in and mail the coupon—no obligation.

THE LUNKENHEIMER CO.
"QUALITY"
CINCINNATI, OHIO, U. S. A.
NEW YORK CHICAGO BOSTON LONDON
EXPORT DEPT. 129-135 LAFAYETTE ST., NEW YORK

THE LUNKENHEIMER CO.
"Quality" Cincinnati, O.
P. O. Box 876
Please send me copy of Lunkenheimer "Guide to Better Service." HJ
Name .....
Firm .....
Address .....

600-37A-89

Tell them where you saw the ad



The new Dallas plant of the Ford Motor Company, costing in excess of $1,500,000.00, is one of the largest industrial plants in the Southwest. The self-supporting stack 96″ x 100′ and Boiler Breeching and twenty-six tanks, including 8 96″ x 30′ pressure tanks furnished by this Company were erected and installed ON TIME and passed the rigid inspection of the architect and Insurance Inspectors without a single criticism.

We manufacture all classes of plate equipment for Refineries and Gasoline Plants. Our extensive experience in fabricating and building dephlegmators, bubble towers, separating towers, scrubbers and absorber towers makes it possible for purchasers who intrust us with the most complicated and intricate character of work to have the assurance the equipment will come thru the shop at the time promised and with every detail completed in conformity with the drawings and specifications.

Your Inquiries Are Solicited.

WYATT METAL & BOILER WORKS

Dallas -:- Texas

Titusville Steel Storage Tanks

Made of the best open hearth homogeneous steel, carefully riveted, caulked, tested and painted before shipment. These tanks are well made, by skilled workmen in a modern shop where only the highest quality of materials are used.

All Titusville Tanks are tested to 50 per cent in excess of working pressure desired, employ pressed steel tap flanges, cast iron flanged nozzels and reinforced tapping throughout.

Let Us Serve You

The TITUSVILLE IRON WORKS Co.
TITUSVILLE - PENNA.

TITUSVILLE EQUIPMENT
Oil Country Boilers
Steam Drilling Engines
Tice Gas Engines
Flapper Valve Pumps
Pumping Powers
Twin Drilling Engines
Rotary Machines Rotary Drawworks
Swivels Slush Pumps
Crown Blocks
Traveling Blocks
Rotary Drilling Specialties

TITUSVILLE OIL COUNTRY MACHINERY
RUGGED - ENDURING

AFFILIATED COMPANIES FOR DISTRIBUTION
For Mid-Continent, Eastern, Western and Coastal Fields:
The Continental Supply Co.
For California:
The Republic Supply Company of California
For Export:
The Continental Well Supply Company,
No. 2 Rector Street,
N. Y. City

"Experience is by industry achieved,
And perfected by the swift course of time."
—*Shakespeare*

The progress of the Dubbs Cracking Process of the past year in improved operation and yields justifies our claim that we can be of great service to every refiner

Universal Oil Products Company
Owners of the Dubbs Process
310 South Michigan Ave
Chicago Illinois

Empire Will Install Cooper Engines in Kansas

The above photograph shows Empire's Cambridge, Kansas, Station, which contains four 485 B. H. P. Cooper gas engines and compressors.

Two 485 B.H.P. Cooper gas engines to operate as a 970 B.H.P. twin unit will be installed in the Empire Companies' Petrolia, Kansas, Compressor Station.

When an organization like the Empire Companies, with a reputation such as theirs for the very best of engineering practice, continues to specify Cooper gas engines and compressors, it lets us know that our policy of giving a little more in both quality and service than a considerable part of the trade expects is appreciated.

The number of larger companies who O. K. this policy by specifying Cooper gas engines and compressors is rapidly increasing.

THE C. & G. COOPER CO.

MT. VERNON, OHIO

1605 Kirby Bldg., Dallas 504 Kennedy Bldg., Tulsa

439 E. 3rd St., Los Angeles

COOPER

OFFICES AT
2002-350 Madison Ave., New York
453 First National Bank Bldg., Chicago
215 Atco Bldg., Tulsa
1201 Haas Bldg. Los Angeles
212 W. T. Waggoner Bldg., Fort Worth

The REFINER and NATURAL GASOLINE MANUFACTURER
Published Monthly by GULF PUBLISHING Co. Houston, Texas
For men engaged in the operating branch of the refining and natural gasoline business.
Vol. 4 April No. 4

R. L. DUDLEY President and Publisher
Price .....$1 per year
Advertising rates upon application to nearest office.
Copyrighted by the Gulf Publishing Co., 1925

Treating Bentonite As a Catalytic to Petroleum and Shale Oils

A short resume of the theories of catalysis and related phenomena

By Joe E. Meyer

THE progress of a chemical change is often modified by the mere presence of a substance which has the same chemical composition after the reaction as at the beginning. Such a substance is termed a catalytic agent and the process is termed catalysis. Berzelius gave this name to the phenomena.

Ostwald says that "when a substance by its mere presence alters the velocity of a reaction, and may be recovered unaltered in nature or amount at the end, is called a catalytic agent and the phenomena is called catalysis."

Nernst says that "Catalysis means an increase in the velocity of a reaction caused by the presence of a substance which does not take part in it (at least only to a secondary extent), altohugh the action is capable of taking place without its presence."

It has been found that certain reactions are hastened by the presence of a catalyst and others are retarded. In reactions in which the velocity of the reaction is increased, the substance is termed a positive catalyst. In reactions in which the velocity is diminished, the substance is termed a negative catalyst.

In the contact method for making sulphuric acid, SO_2 combines with the oxygen to form SO_3. Under ordinary conditions the SO_2 and the oxygen combine very slowly. But in the presence of finely divided platinum or iron the reaction is hastened. With platinum as a catalyst the temperature is maintained near 450 degrees centigrade. But if iron is used the temperature must be higher.

In the Deacon Chlorine Process the following reaction is made use of:

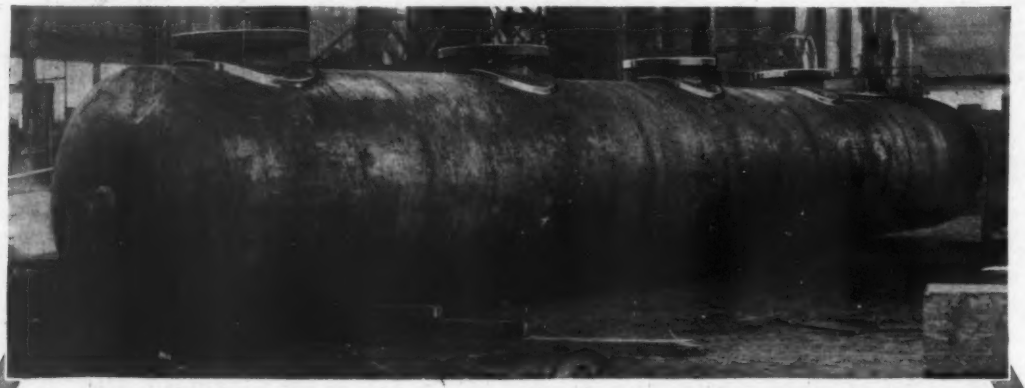
$$4\ HCL + O_2 = 2\ H_2O + 2Cl_2$$

Under ordinary conditions, this reaction does not take place fast enough to be of commercial value. However, Deacon and Hurter put the process on a commercial scale by passing a mixture of hydrogen chloride and oxygen over pumice stone which had been impregnated with cupric chloride which acts as a catalyst. The HCl used in the process must be free from SO_2 and moisture. In practice, the gaseous HCl is dried at 40 degrees centigrade before it is passed into the reacting chamber and the system is maintained at a temperature of 450-460 degrees. Above this temperature, the cupric chloride volatilizes rapidly. Below this tempertaure, the reaction velocity is slow.

In the Haber ammonia process nitrogen and hydrogen are caused to combine. At a tempertaure of 550 degrees centigrade and at a pressure of 200 atmospheres, the amount of ammonia formed by the reaction is 12 per cent. If some catalyst is present, the pressure can be reduced to 50 atmospheres. For laboratory work Osminum and Uraniun carbide are the best catalyst, while platinum has very little catalyst, action. For commercial work, iron is the catalyst used. For best results, it is stated that the catalyst should not be prepared at a temperature greater than 600 centigrade.

In 1830 Kugelman found that ammonia could be oxidized to nitric acid when the reaction was carried out in the presence of finely divided platinum. A mixture of ammonia and ten volumes of air is passed at a velocity of 250 feet per minute over several layers of platinum gauze. The temperature is kept near 300 degrees centigrade. The amount of ammonia formed is 10.7 per cent. A smooth platinum gauze is not effective. After some time it becomes roughened and activated. Ostwald thought that a lower temperature would be effective for the best reaction, but it is found that the temperature most effective is about 825 centigrade. Ammonia from any source may be used, but when a different supply of ammonia is introduced the gauze must be reactivated.

Sabatier and Sanderman discovered a number of years ago that reduced nickel will cause hydrogen and ethylene to combine to form ethane. This has developed into a general hydrogenation process. The vapor of the substance to be reduced is passed directly over the specific catalyst, it being mixed with hydrogen. The temperature is maintained at 150 to 300 centigrade. The metals which are suitable as catalyst are nickel, cobalt, platinum, iron and copper. Nickel is by far the more reactive, while the others are arranged in the order of their activity. The practicability of the method depends largely upon the condition in which the metal is used. It must be prepared by reducing the oxide, the activity depending upon the nature of the oxide employed and the temperature at which it is reduced. In general the greater the surface exposed the greater the activity. Reduction at low temperatures is found to yield a metal which is too active and too sensitive to external influences, while reduction at high temperatures reduces the action to almost zero. Sabatier finds that the best nickel for the purpose is produced by dissolving the metal in nitric acid, calcining the nitrate at a red heat, and then reducing the oxide at a temperature of about 300 to 325 centigrade, until water is no longer evolved. The metal thus prepared must be kept out of contact with



Blaw-Knox Forge and Hammer Welded Pressure Chamber 5′ dia. x 40′ long—1½″ plate.

SEAMLESS—BOTTLE TIGHT OIL CRACKING EQUIPMENT

The Blaw-Knox Forge and Hammer Welding Process makes all joints one with the original plate.

The structure of a Forge and Hammer Welded container is a physically continuous sheet of steel.

BLAW-KNOX COMPANY

666 Farmers Bank Building, Pittsburgh, Pa.

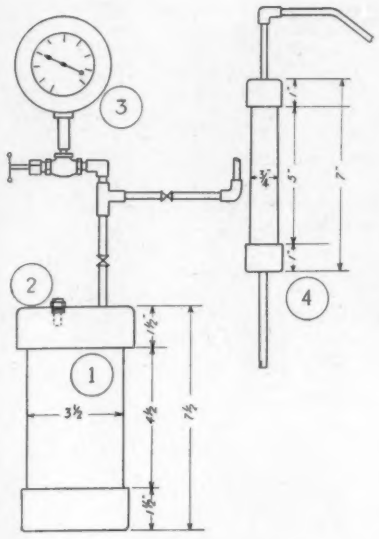
NEW YORK—30 E. 42nd. St.
BALTIMORE—Bayard & Warner Sts.
BIRMINGHAM—Brown-Marx Bldg.
CHICAGO—Peoples Gas Bldg.
DETROIT—Lincoln Building.
BUFFALO—Genesee Bldg.
LONDON, ENGLAND—Caxton House.

BLAW-KNOX

Forge & Hammer WELDING

BLAW-KNOX

Tell them where you saw the ad



the air as it loses its activity on taking up moisture from the air. In order to increase the surface of the catalyst, it is frequently mixed with some supporting material. The materials suggested for this purpose are pumice, kieselguhr, charcoal, and sawdust.

Probably one of the most important applications of this principle is the hydrogenation of oils in the manufacture of Crisco, Cottoline, and products of this type.

The action of organic ferments and enzymes is catalytic. Almost all the important physiological processes, such as assimilation in plants, digestion in animals, and the oxidation of products in the tissues depends on the catalytic action of certain substances, whose chemical nature is as yet unknown. In many respects they resemble the albumins, and all lose their activity in aqueous solutions at fairly low temperatures between 60 and 100 centigrade.

This is one reason why life is destroyed at these temperatures for the vital processes which are chemical in nature and can not be performed without these catalyst or enzymes. They differ exceedingly in other respects, and exercise the most diverse analytical and synthetic functions in the organism.

The action of the catalyst thus far given has been positive in action. The catalyst may have a negative action. An example of this is shown in the retarding of a substance on the oxidation of the sulphites by oxygen. This oxidation will take place readily in air. However, if a small amount of alcohol or manite is added to the sulphite solution the reaction will, for all practical purposes, be brought to a standstill.

At present, to explain catalytic action, there are two theories. The first takes into account the physical properties of the catalyst. The catalyst acts by its surface and not by its mass, which in contact with the body to be transformed, is the seat of the various phenomena, either by solution, occlusion, or by an electrical phenomena.

The other theory accounts for the catalytic action by the formation of intermediate compounds between the catalyst and the substance upon which the catalyst exercises an effect.

The second explanation of catalysis based on the existence of intermediate reactions gives rise to some objections. One comes from the fact that this theory postulates that the catalyst at the beginning and at the end is the same identical compound. Now this is not usually the case. It is usually found that the catalyst is changed. When fresh, it is not immediately apt to affect the reaction; then after a certain length of time it becomes exhausted, and finally ceases to act altogether. This slackening and arrest of the activity on the part of the catalyst, due to a change in the physical condition, is evidently more comprehensible in the first hypothesis than in the second.

Another objection is drawn from the mechanism of the reaction itself. Ostwald says, "it is not sufficient to show that there are intermediate compounds formed, but it must be established that these have a greater velocity of reaction than those of direct action." This excess must moreover be sufficient to make up for the disproportion which exists between the mass of the catalyst and that product which it helps to form. So long as it has not been proved that this is the case, one should speak of accessory reactions, and not speak of intermediate reactions. Finally, at present it is difficult to generalize either one of these explanations. It is evident that in certain cases there are intermediate reactions, but in many others, we find ourselves in a domain of pure hypothesis.

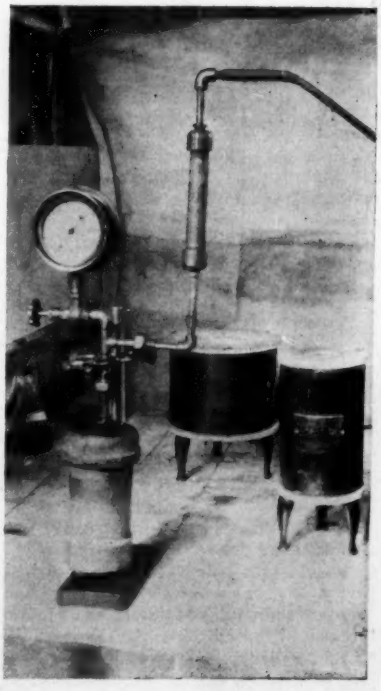
In regard to the formation of intermediate compounds between the catalyst and the substance on which it exerts its influence, there seems to be but one case in which there seems to be no doubt about the formation of such a substance. This is in the case of the catalysis of hydrogen peroxide by mercury. The intermediate formation of mercuric peroxide can be detected by the eye because there is an intermittent formation of a film, which breaks down, only to form again.

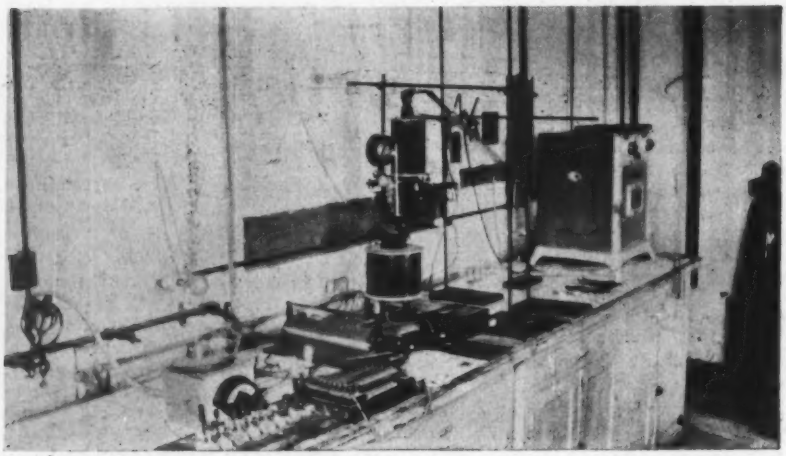
In the Deacon Chlorine Process, some are of the opinion that it is not a case of adsorption catalysis but that an intermediate reaction takes place in which the cupric chloride later unites with oxygen to form cupric oxychloride. This reacts with HCl, after which the series of reactions are repeated.

In the decomposition of ethyl alcohol in the presence of pulverulent alumina as a catalyst, the products formed are ethylene and water. Sabatier believes that the catalytic action of alumina on alcohol is due to the intermediate formation of an unstable compound of alumina and water. On the other hand, Henderson assumes the intermediate formation of aluminum ethylate. However, there seems to be no experimental evidence to support their assumptions.

Some are of the opinion that alumina has a dehydrating action on the alcohol. During the war, ethylene was made by the decomposition of alcohol in the presence of pulverulent alumina. In order to control the temperature, it was found necessary to have a large amount of steam present. This would decrease the rate of decomposition of the alcohol; but this was overcome by working at a higher temperature. It requires a vivid imagination to see how alumina can dehydrate alcohol in the presence of a large amount of water vapor, if the reason the alumina acts is because of its strong adsorption of water vapor.

Bancroft says that "since the reaction is proportional to the difference of chemical potential and inversely proportional to the chemical resistance, we can change the reaction velocity by increasing the difference of chemical potential or decreasing the chemical resistance." He seems to think that the chemical potential is not the important factor in contact catalysis, but that it is probably the change in chemical resistance. "There are two ways in which this might be brought about: We may have more effective collisions between existing molecules or we may have a conversion of one or more of





the reacting substances into an active form."

Daly says that "we may have a partial conversion of one or more of the reacting substances into active forms either through the rupture of the normal valences or of contra-valences, opening up the fields of force."

Langmuir thinks that we have "oriented adsorption" in contact catalysis. In the decomposition of ethyl-acetate in presence of different catalyst, different products are formed. He thinks that if the acetate attaches itself to one adsorbent by the methyl group, to another by the ethyl group, and to the carboxyl group in the case of a third substance, we might have different products formed in the end.

His ideas are better shown by a consideration of his work on tungsten filaments.

He says that unless the molecules of a gas which strike a solid surface all rebound elastically, there will be a higher concentration of the molecules of the gas in the surface layer of the solid than in the body of the gas. If any molecules on the surface are condensed, a certain time interval must elapse before they can evaporate.

This time lag will bring about the accumulation of the molecules in the surface layer, and may be looked upon as the cause of adsorption.

According to the usual physical theory of adsorption by which the adsorbed film is assumed to be a layer of highly compressed gas, we would expect that a gas of such low density at atomic hydrogen would be only slightly adsorbed. Furthermore, that an adsorption film in high vacuum would readily reach equilibrium with its surroundings.

Experiments have shown that even in the highest vacuum quantities of hydrogen as large as 0.01 to 0.03 cubic mm (at atmospheric pressure) per square centimeter could be adsorbed on a cold glass, and that this adsorbed film was remarkably stable, being able to remain unchanged for days. It was further observed that the amount of atomic hydrogen which could accumulate on a given surface was limited and it was not due to the rate at which it escaped at the surface or deposited.

On the contrary, it was shown that the amount was limited because after a certain amount of atomic hydrogen was present on the surface, fresh atoms striking the surface combined with those already present, and thus removed them.

Langmuir summarizes the results of these experiments as follows:

(1) The adsorption is determined by chemical affinity.
(2) The adsorbed layer does not exceed one atom in thickness.
(3) Hydrogen atoms striking glass surfaces are not reflected.

The foregoing resume of the theories of catalysis and related phenomena are introductory to the report of investigations to follow. It is hoped that the preceding syllabus in regard to catalysis will give the reader an insight into the principles on which the investigation to follow was prosecuted.

Investigation of action on a shale oil obtained from the Monarch Shale Oil Products Company, Denver, Colorado. This oil was retorted from Grand Valley Shale in a Ginnet retort.

U. S. B. M. distillation, Hempel method, on a shale from Grand Valley.

Be. gravity of shale oil....22.5
Unsaturation 50.6
Over to 437 F.....21.76%
Be. gravity batch to 437 F. 43.48

Engler distillation of the sample obtained from the Monarch Shale Oil Products Company, Denver, Colorado.

Be. grav. of shale oil, 25.00
Percent over at 390 F. 22.00 Be. Gr., 47.
Percent over at 437 F. 28.00 Be. Gr., 44.5
Unsaturation 59.00%

Remarks: This distillation was made to determine the available gasoline in the shale oil by straight distillation methods.

The catalyst employed in this investigation was prepared as follows:

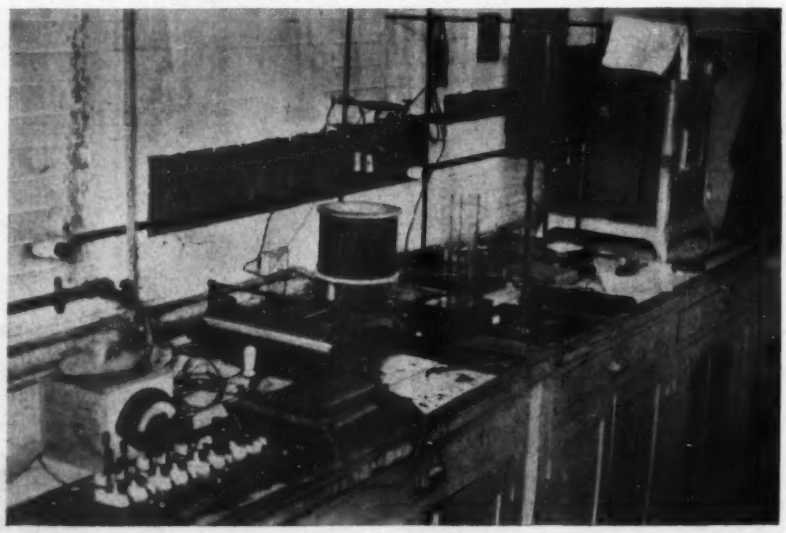
Jabonite Clay;
Silica 55-58%
Alumina 22-26%
Imprities .....CaO; MgO; Fe_2O_3 Na; K, (trace); CO_2; and SO_3

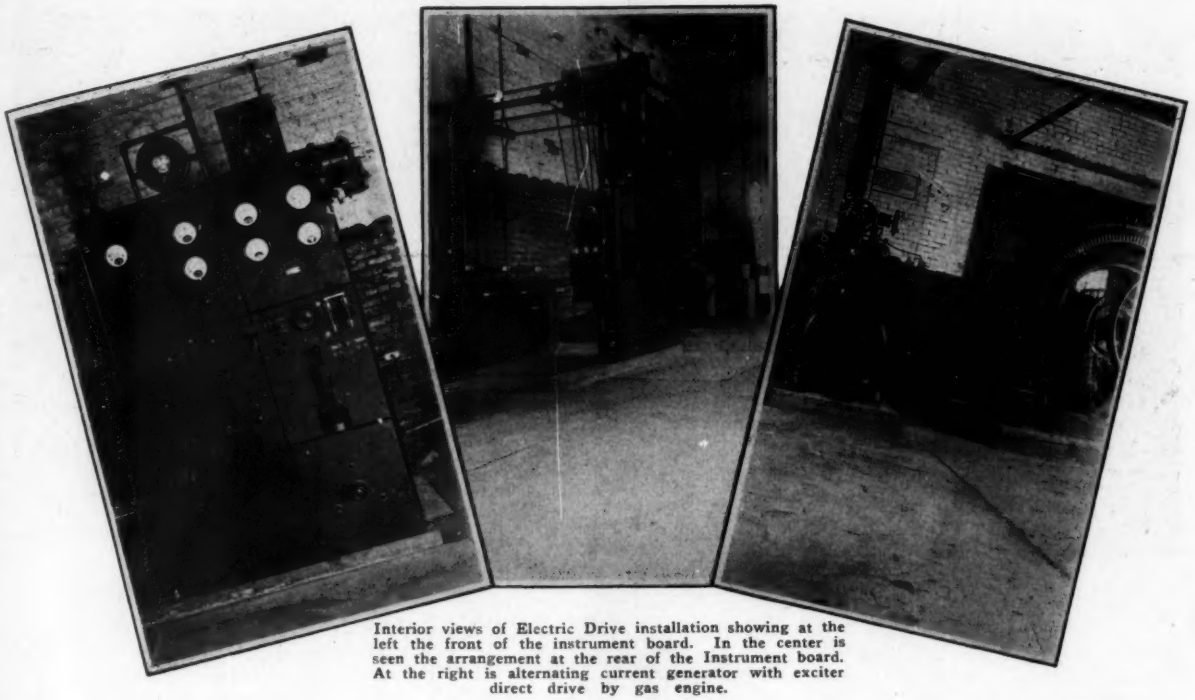
Moisture:
Combined 7- 90%
Mechanical 4-10%
Dried at 105 C., ...7%

This clay was granulated at from three to seven mesh and soaked in sufficient water to thoroughly penertate all the pores of the material, without disintegration.

Nine-tenths pound of concentrated HCl is added in small quantities at a time, under constant agitation. The mass is then left stand for ten or twelve hours, during which time adsorption of the Al_2 Cl_6 takes place and a gelatinous agglomeration is formed, consisting of the chlorides and the silicic acid set free by the addition of the HCl. The entire mass is then heated to 110 centigrade, and further to 300 to 350 centigrade, until dry. The finished product, determined by analysis, should contain from 3 to 6 per cent combined water. Higher temperatures will expel the water, (at about 450 centigrade), and make the mineral inactive. Still higher temper-

(Continued on page 26.)





Interior views of Electric Drive installation showing at the left the front of the instrument board. In the center is seen the arrangement at the rear of the Instrument board. At the right is alternating current generator with exciter direct drive by gas engine.

Electricity Used for Auxiliary Power

Mid-Continent gasoline plants are adopting motors for driving pumping units

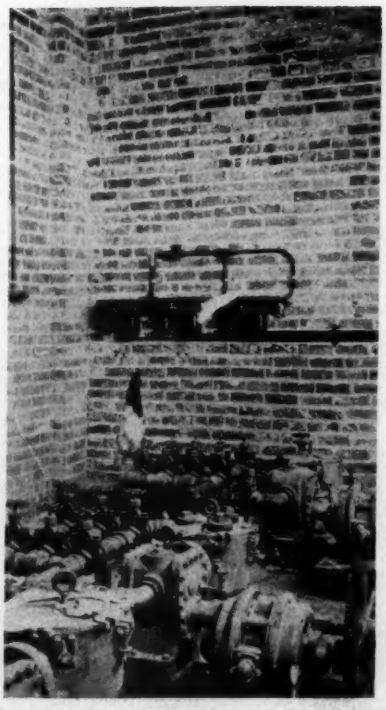
By Grady Triplett

Staff Representative

ELECTRICITY is coming into favor as auxiliary power in the manufacture of natural gasoline in the Mid-Continent area. Where the installations are now operating, individual direct connected motors are used in all pumping. Water, the mineral seal oil and the finished product are each equipped with individual units of centrifugal pumps.

These electric installations are used where it has been the practice to get pumping power through a line shaft, running from the main power plant into the pump house, the line shaft being driven by gas engines. While the electric installation does not eliminate the gas engine, it does offer some advantages not possible when using line shaft power. Unless electric current is bought from a commercial concern, the practice in Oklahoma is to generate electricity at the plant, gas engines being used to drive the generators.

The use of electric motors for auxiliary power was introduced by the Skelly Oil Company at the Lyman plant. Emby Kaye, superintendent of the natural gasoline department, worked out the details of this installation, the work being done by the Petroleum Electric Company. Performance of the equipment has exceeded expectations.



Motor driven rotary pumps, direct connected

Advantages Gained

Other plants equipped with electric Power for auxiliary drives are the Roxana Petroleum Corporation at Stroud, Phillips Petroleum Company in the New Slick field, the Carter Oil Company at Cromwell, and the Sand Springs Home at Sand Springs.

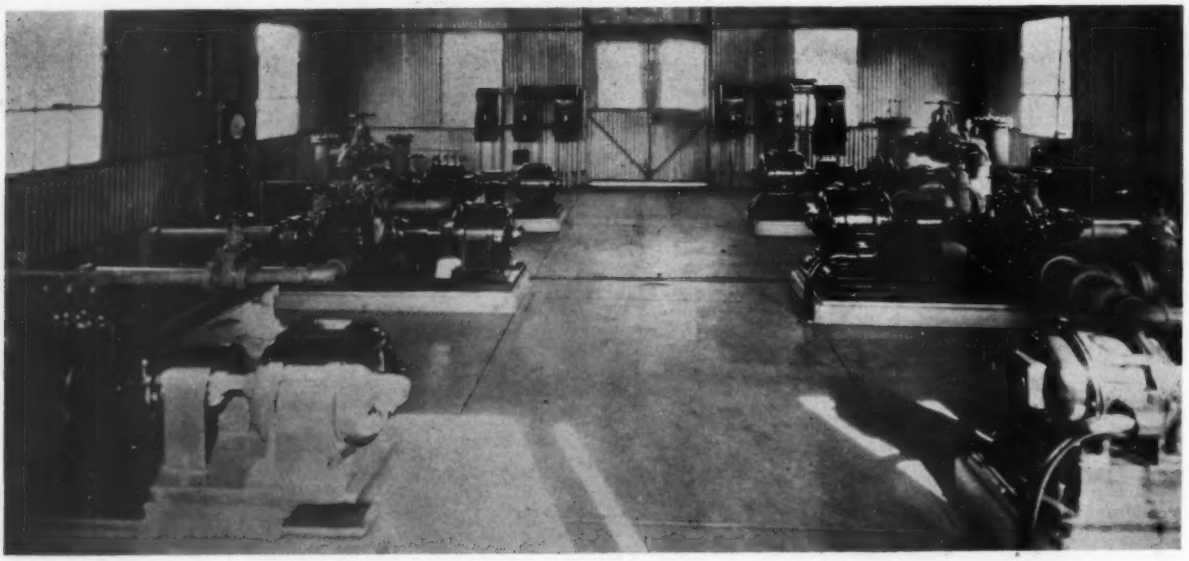
Investigation among men responsible for these installations reveals three advantages gained through the adoption of electricity for auxiliary power:

1. More flexible and reliable conditions;

2. Increased plant output due to continuous operation of the plant and more even flow of the absorbing agent;

3. Reduced installation costs, due to the possibility of shortening the lines through which liquids must be pumped, as pumps can be located near the points where their work must be performed.

The first of these advantages comes through the elimination of the line shaft for pumping purposes. Mechanical engineers recognize the inefficiency of the line shaft but it has been a part of natural gasoline plant construction,



Oil pump house of Swelley Oil Company Lyman plant. Wagner motors, with automatic control, chain driven to Roots pumps

due to fact that power coming from one source, had to be transmitted into another building. The gasoline plant has used gas engines in the plant proper to drive the line shaft, which ran into the pump house nearby, the pumps being driven by belts.

This has been eliminated by the use of individual motors for the pumps. These direct driven installations further eliminate the power losses necessary to line shafts and belt drives.

Keeps Plant Going

Then the equipping of each pump with its own motor eliminates the possibility of the whole plant being shut down, due to the failure of one prime power. Where the line shaft is used, the whole pumping equipment must cease operation if any part of the driving power is out of commission. The stopping of the pumps, of course, means the stopping of the whole plant until repairs or adjustments can be made.

But with individual motors, the loss of one pump does not hinder the operation of others.

Electric pumping power makes for increased output in a natural gasoline plant by supplying a steady flow of the absorbing agent, usually mineral seal oil. The highest recovery is possible only when the absorbing agent is kept moving at a fixed rate at all times.

Cromwell plant of Carter Oil Company, showing General Electric motors direct connected to Goulds pumps.

This is obtained by motor driven pumps, since the direct connections leave but scant variation in speed, whether the equipment is carrying peak load or no load at all. The even torque of the motors produces an even flow through the centrifugal pumps. While line shaft power for pumps results in varying speeds of the pumping equipment.

Placing Pumps

More favorable placing of the pumping equipment is possible with electric power, since the units can be placed where they are needed.

In the case of line shaft power, all pumps must be housed in one building, which must be near the main power plant in order to eliminate the installation of long line shafts. With all the pumps in one building, the pipes for carrying the fluids must be excessive in length, as they must extend from the source of the material to the pump house and then to the point where the material must be transmitted.

With electric drive, the pumping units can be installed near the points where the work must be performed. Pumps for the mineral seal oil can be near the absorbing towers. The water pumps can be near the pond, while the pumps for loading can be near the stock tanks.

The design of a plant will determine the placing of pumps. In some of the installations, the water pumps are placed in the same building with the generator, allowing one man to look after all this equipment. Other pumps are placed where the minimum of piping will be necessary for carrying the materials. Savings in pipe often are sufficient to offset the cost of the electrical equipment.

Sources of electricity depend on local conditions. A generator can be installed or current can be bought.

(Continued on page 28.)

Pure Adds Centrifugal Cold Settling Plant

Cabin Creek improvement considered one of most important developments in refining activity

By Clyde D. Moore

A NEW cetrifugal cold settling plant, which is regarded as one of the most important refinery improvements the company has ever made, was recently completed and put into operation by the Pure Oil Company at its Cabin Creek refinery, Cabin Creek Junction, West Virginia.

In the develoment work and installation of the process the company spent approximately half a million dollars. In consideration of the many advantages gained, however, the investment has already more than justified itself.

General Arrangement

The two story building in which the plant is housed is as nearly fireproof as engineering ingenuity could devise. Only brick, concrete and steel entered into the construction.

All pumps, wax tank, slop tank, separator tank and hot water carrier are located on the first floor. The second floor is occupied entirely by the super-centrifugal machines, while the elevated oil supply tank is in the apex of the building, about ten feet above the second floor level.

Chilling System

The refrigeration necessary for this process it supplied by one 110-ton Carbondale ice machine which furnishes brine at a temperature of about 20 degrees Fahrenheit. This refrigeration is sufficient to chill 100,000 gallons of oil from 100 degrees Fahrenheit, to 10 degrees through a period of 48 hours.

The heating and blending tank has a capacity of 1800 barrels and is built of quarter inch steel. This tank is equipped with heating coils to raise the temperature of the oil to 115 degrees Fahrenheit over a period of five hours. Through the use of a mechanical agitator a perfect dilution without loss of naphtha is insured.

The chilling tanks are of the same construction as the heating and blending tanks. These tanks are insulated on the bottom with 4 inches of cork and on the sides with 4 inches of Johns-Manville hairfelt. Over this has been placed a layer of white top roofing. The insulation of these tanks is necessary because of the low temperature to which the oil they contain must be brought.

Each tank is provided with 8,400 feet of 2 inch steel coil for chilling brine, the inlet being at the top and the outlet at the bottom.

Tanks Used

Agitators are provided as in heating and blending tank, and are operated about ten minutes each hour at regular periods for 48 hours to insure uniform temperature and prevent stratification in chilling.

Other tanks necessary for the process are wax free oil run down tank, carrier liquid tank, separator tank, wax tank, elevated oil supply tank and slop tank.

The chilling and transferring of oils require the use of nine pumps which are all of the motor driven rotary type. To reduce the fire hazard all fuses have been placed on the outside of the building, while the switches necessary inside the building are of the oil type.

The pipe lines handling all cold oil and brine have been insulated with Johns-Manville hairfelt insulation, as have all valves and fittings.

Method of Operation

Following is a description of the manner in which the plant is operated for the manufacture of bright stock: Before chilling, the stock is diluted with a naphtha (having an initial of 180 and an end point of 385) using 61 per cent naphtha and 39 per cent stock. The material so prepared is then passed to filters and filtered to a 6 color. After filtering operation it is then pumped to cold settling plant.

The dilute stock is pumped to the heating and blending tank and brought to a temperature of 110 degrees Fahrenheit, agitating at the time to insure a perfect solution. From this point it is taken to one of the chilling tanks where it is chilled gradually through a period of 48 hours to a temperature of 10 degrees Fahrenheit.

The chilled oil is then passed continuously through the battery of supercentrifuges which separate the wax from the oil. The wax free oil is continuously discharged from one outlet of the machine while the wax is passed out another.

The essential feature of the centrifugal separation of wax from lubricating oil is the continuous discharge of the wax from the machines. For this purpose a special rotor has been constructed.

Continuous Separation

Hot water at a temperature of about 140 degrees Fahrenheit termed "carrier liquid" is fed by jets into the head of the machine. The carrier liquid, being heavier than the wax or oil, maintains itself as a flexible carrier in the form of a cylindrical layer on the periphery of the rotor of machine. The stiff wax is deposited upon the surface of the water and by it conveyed from the machine. In other words, it insures a complete and continuous separation of

(Continued on page 94.)

Air view of the Cabin Creek plant of the Pure Oil Company

Treated Bentonite as a Catalytic To Petroleum and Shale Oils

(Continued from page 22.)

atures, (above centigrade), will expel HCl and leace the original mineral as an anhydrous aluminum silicate and impurities.

Treatment of the oil by the catalyst was effected in the vapor phase. The apparatus and diagramatic view of the same as used to effect contact of the catalyst and oil vapors is illustrated in the following paragraphs.

Number 1 is a small still construct- of a 3½-inch nipple 4½ inches long, capped at both ends with 3½-inch caps. The cap on the lower end of the still is ground down to a diameter of 4 inches. The cap on the upper end is drilled and tapped for a ¼-inch pipe (vapor line), and for a ½-inch reduction. A short ¼-inch nipple is inserted in the lower half of this reduction and the top half being fitted with a ¼-inch reduction. This ½-inch reduction and accessories constitutes the thermometer well.

Number 2 illustrates the method employed to seal the thermometer well.

Number 3 is a pressure gauge.

Number 4 is a tube for the catalyst. This tube is constructed of a ¾-inch nipple 5 inches long capped at both ends with ¾-inch caps. Both the lower and upper caps are drilled and tapped for a ¼-inch pipe.

The small still has a capacity of 500 cc's.

In operation the still is placed in a Hoskins, type FD-103 electric furnace. The internal diameter of this type Hoskins furnace is 4¼ inches. The depth 4¾ inches. This type of furnace, it will be seen, makes a convenient heating element for the still. Temperature control is effected with a rheostat of sufficient current capacity. (10 Amps.)

The tube containing the catalyst is placed in a Hoskins, type EA-120 electric furnace. The internal diameter of this type Hoskins furnace is 1½ inches. The depth, 6½ inches. The catalytic agent is thus completely surrounded by the heating element of the furnace and a variable and accurate heat control is obtainable.

Temperatures in the tube containing the catalyzer are recorded with a Hoskins, type HA thermo-electric pyrometer. The thermocouple is inserted between the furnace wall and the wall of the tube containing the catalyst. The temperatures recorded with this arrangement are undoubtedly some higher than the temperatures existing within the tube. The temperature lag is never more than five degrees Fahrenheit, however. This was determined by placing a thermometer in the tube and comparing the temperature readings. Temperature control effected with a rheostat of ten amperes current capacity.

The vapor arm leading from the top of the tube containing the catalyst is connected with a 20-inch Liebig condenser with suitable water supply and overflow.

All connecting pipe and fittings are heat insulated with asbestos blanketing.

Distillation in Special Apparatus Using Treated Bentonite as a Catalytic Agent

The oil used for this distillate was obtained from the Monarch Shale Products Company, Denver, Colo., and is the same oil as was used in the distillation to determine the available gasoline in Grand Valley shale oil retorted by the Ginnet process. This run was made on 3-5-24. The distillate obtained was fractionated on 3-7-24. Results as follows:

Engler distillation. Charge: 220 cc's.
O.P. 158 F.
10% 252 F.
20% 300 F.
30% 328 F.
40% 362 F.
50% 404 F.
60% 434 F.
70% 476 F.
80% 512 F.

Remarks: Distillation was not carried to the dry point. Based on the original charge taken in the retort the percentages of recovery are as follows:

20% over to 390 F.
25% over to 422 F.
27% over to 347 F.
29% over to 460 F.
Be. Gr. batch to 437 F., 43.5.
Unsaturation: 55%.

A check run was made on 3-26-24, using the same apparatus and the same oil. (Monarch Shale Products Company. Be. Gr.: 25)

Engler distillation made on the distillate obtained. Fractionation results as made in the original run in the retort omitted as unessential.

20% over to 378 F.
22% over to 392 F.
27% over to 437 F.
29% over to 460 F.
43.8% over to 527 F.
Be. Gr. batch to 393 F., 46.5.
Be. Gr. batch to 437 F., 44.75.
Be. Gr. batch 437 to 527 F., 29.
Unsaturation of batch to 437: 55%.

Comparison of Results

Straight distillation:
Gasoline to 437 F., 28%.
Batch Be. Gr., 44.5.
Unsaturation: 59%.
Bentonite in special apparatus:
Gasoline to 437 F., 27%.
Batch Be. Gr., 44.75.
Unsaturation: 55%.
U. S. B. M. Distillation. Hempel Method (By U. S. B. M.)
Gasoline to 437 F., 21.76%.
Batch Be. Gr., 43.48.
Unsaturation: 50.6%.

Remarks: This shale oil had a Baume gravity of 22.5, as compared with 25 of that above.

A comparison of the results of the straight distillation and the distillation made in the special apparatus using treated Bentonite as a catalyst may be made as follows: A 4 per cent decrease in unsaturation by using the treated Bentonite will be noted. This may be interpreted as a 3 per cent increase in yield. Decrease in unsaturation loss to acid may be considered as an increase in yield. It will also be noted that the yield in volume of distillate in the case of the straight distillation was 1 per cent greater than that of the straight distillation as carried out in the special apparatus.

Investigation of the catalytic action of treated Bentonite on a representative crude oil.

Crude employed for the test: Big Muddy, Wyoming. Following is a U. S. B. M. distillation, Hempel method. (Distillation made by the U. S. B. M.)
Gasoline: 22.2%, Baume gravity, 53.7.
Kerosene: 15.7%, Baume gravity, 38.3

Distillation in special apparaus using treated Bentonite as a catalyst. Catalyst used in the vapor phase.

Distillation number: 1.
Gasoline: 33%, Baume gravity, 52.0.
Kerosene: 7.4%, Baume gravity, 39.2.

Remarks: Increase in gasoline yield; 11%, decrease in kerosene yield; 8.3%. It is interesting to note that the decrease in the gravity of gasoline in the case of that produced in the special apparatus is approximately the same as the increase in the gravity of kerosene produced in the same apparatus as compared with the results obtained by the U. S. B. M. on the same oil for kerosene.

Investigation of the catalytic action of treated Bentonite on Tonkawa crude oil. Be. Gr., 42.3.

Following is a Hempel method distillation on this sample of Tonkawa crude:

Distillation number: 2.

O.P.	112 F.	cc's	Sum cc's
Up to	122 F.	1	1
122—	167 F.	11	12
167—	212 F.	16	28
212—	257 F.	29	57
257—	302 F.	25	82
302—	347 F.	24	106
347—	392 F.	21	127
592—	437 F.	18	145
437—	482 F.	Not recorded	...
437—	527 F.	37	182

Percent over to 392 F., 42.3%.
Baume gravity, 58.0
Percent over to 437 F., 48.3%.
Baume gravity, 56.0
Kerosene. 12.3%. Baume gravity 39.5

The bottoms remaining in the distillation above were mixed intimately with treated Bentonite and the distillation continued to 700 F.

Remarks: No noticeable catalytic action.

Investigation of the catalytic action of treated Bentonite on Tonkawa crude oil. Catalyst used in the vapor phase.

This distillation was made in the special apparatus and the sample used

came from the same barrel as that used for the Hempel distillation.

Data on the distillation is as follows:

Distillation number: 3. Still charge: 500 cc.

First over 202 F.		cc's	Sum cc's
167 to	212 F.	3	3
212—	257 F.	26	29
257—	302 F.	51	80
302—	347 F.	70	150
347—	392 F.	33	183
392—	437 F.	28	211
437—	482 F.	21	232
482—	527 F.	25	257
527—	572 F.	32	289
572—	617 F.	14	303
617—	662 F.	18	321
662—	680 F.	29	350

20% over at 318 F.
30% over at 347 F.
40% over at 416 F.
50% over at 520 F.
70% over at 680 F.
Total over: 74.8%

Per cent over to 392 F., 36.6%
Per cent over to 437 F., 42.2%
Per cent over to 527 F., 51.4%
Baume gravity batch to 437 F., 59.5
Baume gravity 437 to 527 F., 44.5
Baume gravity 527 to 617 F., 39.9
Baume gravity 437 to 617 F., 43.0

Remarks: The first distillate over had a peculiar red color. This color was attributed to the small residue remaining in the still from a previous shale oil distillation as no red coloration was observed in subsequent runs.

Hempel distillation on the distillate obtained in the run recorded above.

Distillation number: 4. Charge: 290 cc.

O.P.	130 F.	cc's	Sum cc's
Up to	122 F.	..	..
122 to	167 F.	7	7
167—	212 F.	39	46
212—	257 F.	45	91
257—	302 F.	43	134
302—	347 F.	36	170
347—	392 F.	38	208
392—	437 F.	35	243
437—	482 F.	Not recorded	
437—	527 F.	36	279

Per cent over to 392 F., 41.6%
Per cent over to 437 F., 48.6%
Per cent over 437 to 527 F. 7.2%
(Kerosene)
Baume gravity batch to 392 F....58.0
Baume gravity batch to 437 F....55.8
Baume gravity 437 to 527 F.....40.5

U. S. B. M. Hempel distillation on this same crude. (Made by the U. S. B. M.)

Gasoline: 46.4% (To 437 F.)
Kerosene: 12.1% (To 527 F.)

Investigation of the catalytic action of lithium chloride on Tonkawa crude oil. Be. Gr., 42.3.

In this experiment the lithium chloride was used as a catalyst in the vapor phase and in the same apparatus as was the treated Bentonite. The sample of Tonkawa crude taken for this distillation came from the same barrel as that taken for use in the experiment employing treated Bentonite as a catalyst.

Data on the experiment is as follows:

Distillation number: 5. Still charge 500 cc.

First over 202 F.		cc's	Sum cc's
167	to 212 F.	3	3
212—	257 F.	22	25
257—	302 F.	41	66
302—	347 F.	42	108
347—	392 F.	35	143
392—	437 F.	41	184
437—	482 F.	56	240
482—	527 F.	24	264
527—	572 F.	22	286
572—	617 F.	37	323
617—	662 F.	Not recorded...	
617—	680 F.	54	377

Per cent over to 392 F. 28.6%
Per cent over to 437 F., 36.8%
Per cent over to 527 F., 52.8%
Total over to 680 F., 75.4%
Baume gravity batch to 437 F., 61.5
Baume gravity 437 to 527 F., 45.5
Baume gravity 527 to 680 F., 38.0

Hempel distillation on the distillate obtained in the run recorded above

Distillation number: 6. Charge: 300 cc.

Distillation number: 7. Charge: 300 cc.

O. P. 112 F.		cc's	Sum cc's
Up to 122 F.		1	1
122—167 F.		8	9
167—212 F.		20	29
212—257 F.		26	55
257—302 F.		26	81
302—347 F.		24	105
347—392 F.		20	125
392—437 F.		20	145
437—482 F.		19	164
482—527 F.		14	178
527—572 F.		18	196
572—617 F.		12	208
617—662 F.		8	216

Per cent over to 392 F., 41.6%
Per cent over to 437 F., 48.3%
Per cent over to 527 F., 54.6%
Baume gravity batch to 392 F., 59.2
Baume gravity batch to 437 F., 56.3
Baume gravity 437 to 527 F., 39.7

The following are the tabulated results of the various experimental runs in the special apparatus and the control distillations made for comparative purposes:

	Dist. No. 1 Per Ct.	Dist. No. 3 Per Ct.	Dist. No. 5 Per Ct.	Dist. No. 7 Per Ct.	Dist. No. 8 Per Ct.
Per cent over to 392 F.,	16.8	36.6	28.6	41.6	26.2
Per cent over to 437 F.,	21.8	42.2	36.8	48.3	32.7
Per cent over to 527 F.,	29.2	51.4	52.8	54.6	43.2
Be. Gr. batch to 392 F.	...	...	...	59.2	...
Be. Gr. batch to 437 F.	55.5	59.9	61.5	56.0	59.7
Be. Gr. 437 to 527 F.	...	44.5	45.5	39.7	...
Be. Gr. 527 to 617 F.	...	39.9	...	...	...
Be. Gr. 437 to 617 F.	...	43.0	...	...	...
Be. Gr. 527 to 680 F.	...	...	38.0	...	...
Be. Gr. batch to 527 F.	...	...	...	...	56 5

O.P.	130 F.	cc's	Sum cc's				
Up to	122 F.	..	..	10%	199 F.	29	
122—	167 F.	7	7	20%	226 F.	58	
167—	212 F.	43	50	30%	254 F.	87	
212—	257 F.	45	95	40%	286 F.	116	
257—	302 F.	41	136	50%	313 F.	145	
302—	347 F.	41	177	60%	350 F.	174	
347—	392 F.	35	212	70%	384 F.	203	
392—	437 F.	28	240	80%	416 F.	232	
437—	482 F.	20	260	90%	450 F.	261	
482—	527 F.	14	274				
527—	560 F.	6	280				

Per cent over to 392 F., 42.4%
Per cent over to 437 F., 48.0%
Per cent over to 437 F., 48.0%
Baume gravity batch to 437 F., 56.5
Baume gravity 437 to 527 F., 40.2

Investigation of the catalytic action of lithium chloride on Tonkawa crude oil. Gravity: 42.3.

Catalyst used in the liquid phase.

In this experiment the lithium chloride was used as a catalyst in the liquid phase. The apparatus was slightly modified to accommodate the changed conditions. In order to reduce to a minimum, condensation of vapors in the assembly provided for utilization of catalysts in the vapor phase, and, the consequent refluxing of these condensates and their return to a zone of higher temperature where partial decomposition might be expected, this unit of the apparatus was removed. In its place was installed a vapor line, the arrangement of which requires but a few words in order that it may be visualized. A short ¾-inch nipple was installed in the hole drilled and tapped for the vapor line in the top of the still. The vapor line and street ell were removed from the vapor phase assembly

and attached to the free end of this nipple, thus providing a short and direct route for the vapors from the still to the condenser.

The anhydrous lithium chloride used as a catalyst in this experiment was placed directly in the still where intimate contact with the oil in the liquid phase was accomplished.

Data on the experiment is as follows:

Legend

Distillation No. 1. Big Muddy crude in special apparatus using treated Bentonite as a catalyst in the vapor phase.

Distillation No. 3. Tonkawa crude in special apparatus using treated Bentonite as a catalyst in the vapor phase.

Distillation No. 5. Tonkawa crude in special apparatus using Lithium Chloride as a catalyst in the vapor phase.

Distillation No. 7. Tonkawa crude in a modified arrangement of the special apparatus using Lithium Chloride as a catalyst in the liquid pjhase.

Distillation No. 8. Tonkawa crude in special apparatus using treated Bentonite in the vapor phase as a catalyst. The tube containing the catalyst in this experiment was not enclosed in the heating element. Heat insulation of the tube was effected by means of asbestos blanket.

Tabulated results of distillations, (U. S. B. M. Hempel Method), on a Tonkawa crude sample and on the distillates obtained from experimental runs in the special apparatus using this crude oil.

	Dist. No. 2 Per Ct.	Dist. No. 4 Per Ct.	Dist. No. 6 Per Ct.	Dist. No. 9 Per Ct.
Per cent over to 392 F.	42.3	41.6	42.4	42.2
Per cent over to 437 F.	48.3	48.6	48.0	47.2
Per cent over to 527 F.	60.7	55.2	54.8	57.2
Be. Gr. batch to 392 F.	58.0	58.0	...	57.5
Be. Gr. batch to 437 F.	56.0	55.8	56.5	56.0
Be. Gr. 437 to 527 F.	39.5	40.5	40.2	40.1

Legend

Distillation No. 2. U. S. B. M. Hempel Method distillation on a sample of Tonkawa crude. Baume gravity of crude: 42.3.

Distillation No. 4. U. S. B. M. Hempel Method distillation on the distillate obtained in Distillation No. 3.

Distillation No. 6. U. S. B. M. Hempel Method distillation on the distillate obtained in Distillation No. 5.

Distillation No. 9. U. S. B. M. Hempel Method distillation on the distillate obtained in Distillation No. 8.

Interpretation of Results

Comparing Distillation No. 4 (Treated Bentonite) with Distillation No. 2 (U. S .B. M. Hempel Method), it will be observed that the gain in motor fuel is negligible and that the Baume gravity is approximately the same.

Comparing Distillation No. 6 (Lithium Chloride as a catalyst) with Distillation No. 2, it will be observed that there was no appreciable gain in motor fuel produced and that the Baume gravity was approximately the same.

Comparing Distillation No. 6 with Distillation No. 4 examination will show that the results are approximately the same for both catalysts.

Comparing Distillation No. 7 (Lithium Chloride as a catalyst in the liquid phase) with Distillation No. 2 it will be noted that the percentages over to 437 F., and the Baume gravity are respectively identical.

Comparing Distillation No. 9 (Treated Bentonite in the vapor phase,—the tube containing the catalyst not being enclosed in the heating element) with Distillation No. 2, it will be noted that the percentage of motor fuels was 1.1 per cent less although the Baume gravity was the same in both distillations.

Conclusions

Under the conditions investigated it is thus evident that vapor phase utilization of the catalysts employed is not productive of greater yields of commercial motor fuel from the crudes selected for the test in the foregoing experiments.

Electricity Used for Auxiliary Power

(Continued from page 24.)

Where commercial high tension wires are convenient and there is a market for residue gas, it often is desirable to buy current.

Gas For Generating

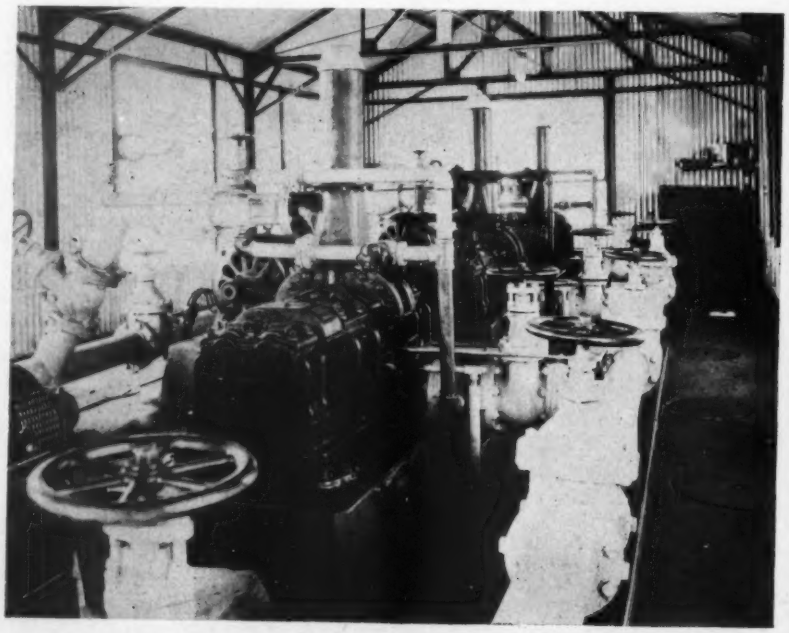
When current is generated, a gas engine is used, direct-connected to the generator. This gas engine does not come in the line of extra equipment, as it would be used for driving the line shaft in the older and more common installations of gasoline plant equipment.

Generating equipment best suited for gasoline plants consists of three phase 480 volt alternating type generators, direct connected to a gas engine. These must be housed in a separate building, often with the water pumps as mentioned previously. Adequate control equipment is essential. The swicthboard with necessary instruments, such as voltage regulators, synchronizing devices and switches are the main requirements. Transformers are necessary for reducing the voltage from 480 to 110 volts, for lighting purposes.

Correct Firing

Wiring inside the plant should be in iron conduits, with all outlets such as lamps and switches in vapor proof units. For the outside wiring, underground steel-armored cables are preferable.

The type of motor best suited for gasoline plant pumping is the squirrel cage induction motor. These have no brushes and cause no spark in their operation. These should be equipped with automatic starting devices, operated by means of "start and stop" control stations.



Gasoline plant of Sand Springs Home, motor driven. The gasoline pump in the fore ground is a Dayton-Dowd, direct connected to Wagner motor.

REFINERY AND NATURAL GASOLINE PLANT

BUYERS' GUIDE

FOR EQUIPMENT AND SUPPLIES

THE large variety of equipment and supplies used by the Refining and Natural Gasoline industries makes the problem of purchasing a real one in this branch of the oil industry. The BUYERS' GUIDE, giving in easy reference form a complete list of products used together with the name and address of the manufacturer, has been compiled with the idea of lessening this burden.

This is the first attempt to furnish the trade with information of this type and it has only been possible through the co-operation of the many concerns manufacturing equipment used in refining and natural gasoline plants. It is urged that the Buyers' Guide be kept handy for easy reference whenever equipment purchases are to be made.

Directions for Use

Information in the Guide has been arranged according to products, classified under their most common and accepted names and using the main noun as the key index word. However, exceptions have been made to the latter in cases where equipment is more generally known by a combination of words. All concerns listed in the Guide who have advertisements in this issue of The Refiner and Natural Gasoline Manufacturer have references to the pages on which their advertisements appear. Much valuable information can be secured by following these references.

EQUIPMENT BUYERS GUIDE

ABSORBERS
Hope Engineering & Supply Company, Mt. Vernon, Ohio
Newton Process Manufacturing Co., Fullerton, Calif.
United Iron Works, Inc., Kansas City, Mo. See page 95.

ACETYLENE APPARATUS
Air Reduction Sales Co., 342 Madison Ave., New York, N. Y.
Carbic Mfg. Co., Duluth, Minn.
Cash, A. W., Co., Box 35, Decatur, Ill.
International Oxygen Co., 796 Frelinghuysen Ave., Newark, N. J.
Modern Engineering Co., 3411-13 Pine Blvd., St. Louis, Mo.
Oxweld Acetylene Co., 302 Thompson Ave., Long Island City, N.Y.

ACETYLENE GAS
Air Reduction Sales Co., 342 Madison Ave., New York
International Oxygen Co., 796 Frelinghuysen Ave., Newark, N. J.
The Prest-O-Lite Co., Inc., Carbide and Carbon Bldg., 30 E. 42d St., New York, N. Y.

ACCUMULATORS
Aldrick Pump Co., Allentown, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
John Dollinger, Jr., Inc., Beaumont, Texas
Mesta Machine Co., Pittsburgh, Pa.
Southwark Foundry & Machine Co., 133 Water St., Philadelphia, Pa.
U. S. Cast Iron Pipe & Foundry Co., Burlington, N. J.
Watson-Stillman Co., 35 Church St., New York, N. Y.
R. D. Wood & Co., 400 Chestnut St., Philadelphia, Pa.

AERATORS
C. F. Braun & Co., Alhambra, Cal. See pages 52-53.

AFTERCOOLERS
Andale Engineering Co., 1015 Chestnut St., Philadelphia, Pa.
Bury Compressor Co., 1712 Cascade St., Erie, Pa.
Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.
The Griscom-Russell Co., 94 West St. New York City. See page 9.
Ingersoll-Rand Co., 11 Broadway, New York, N. Y.
Mesta Machine Co., Pittsburgh, Pa.
Schutte & Koerting Co., 1165 Thompson S., Philadelphia, Pa. See page 39.

AGITATORS
Chicago Bridge & Iron Works, 2131 Old Colony Bldg., Chicago, Illinois
Columbian Steel Tank Co., 1401-1631 W. Twelfth St., Kansas City, Mo.
John Dollinger, Jr., Inc., Beaumont, Texas
Graver Corp., 420 Todd Ave., East Chicago, Ind. See page 3-33.
Harris, Arthur & Co., 212 Curtis St., Chicago, Ill.
The Hill Clutch Machine & Foundry Co., Cleveland, Ohio.
Kansas City Structural Steel Co., Kansas City, Kansas
Milwaukee Reliance Boiler Works, Milwaukee, Wis.
N. Y. Central Iron Works Co., Box 66, Hagerstown, Md.
The Petroleum Iron Works Co. of Ohio, Sharon, Pa.
Pittsburgh-Des Moines Steel Co., Curry Bldg., Pittsburgh, Pa.
Schutte & Koerting Co., Philadelphia, Pa. See page 39.
Sowers Mfg. Co., 1300 Niagara St., Buffalo, N. Y.
The Standard Boiler & Plate Iron Co., Niles, Ohio
M. H. Treadwell Co. of Ill., 208 S. LaSalle St., Chicago, Ill.
United Iron Works, Inc., Kansas City, Mo. See page 95.
U. S. Cast Iron Pipe & Foundry Co., Burlington, N. J.
Walsh & Weidner Boiler Co., Chattanooga, Tenn.
Warren City Tank & Boiler Co., Warren, Ohio
The Western Gas Construction Co., 1432 Buchanan St., Fort Wayne, Indiana

ALTERNATORS
Electric Machinery Mfg. Co., 14th & Tyler St., N. E., Minneapolis, Minnesota

ANALYZERS, Gas
Fort Worth Laboratories, 828½ Monroe St., Fort Worth, Texas See page 84.
The Jos. W. Hays Corporation, Michigan City, Indiana
The Refinery Supply Co., Fourth and Detroit Sts., Tulsa, Okla. See page 86.

ANCHORS, Pipe
C. F. Braun & Co., Alhambra, Cal See pages 52-53.

AMMETERS AND MILLI-AMMETERS
Illinois Testing Laboratories, Inc., 141 W. Austin Ave., Chicago, Ill.

ANEMOMETERS
Davis Instrument Mfg. Co., 110 W. Fayette St., Baltimore, Md.

APPARATUS, Aluminum
Aluminum Co. of America, 2400 Oliver Bldg., Pittsburgh, Pa.

ARCHES, Boiler
American Arch Co., Inc., 17 E. 42nd St., New York, N. Y.
Brownell Co., Dayton, Ohio
Camden Fire Brick Co., Sixth & Everett Sts., Camden, N. J.
Casey Hedges Co., Chattanooga, Tenn.
M. H. Detrick Co., 140 S. Dearborn St., Chicago, Ill. See page 89.
Titusville Iron Works Co., Titusville, Pa. See page 16.
Walsh & Weidner Boiler Co., Chattanooga, Tenn.

ARCHES, Combustion Chamber
Camden Fire Brick Co., Sixth & Everett Sts., Camden, N. J.
Casey-Hedges Co., Chattanooga, Tenn.
M. H. Detrick Co., 140 So. Dearborn St., Chicago, Ill. See page 89.
Green, A. P., Fire Brick Co., Mexico, Mo.
Laclede-Christy Clay Products Co., 1673 Railway Exchange Bldg., St. Louis, Mo
Titusville Iron Works, Titusville, Pennsylvania. See page 16.
Waite & Davey Co., Inc., 5 Court Square, Long Island City, N. Y.
Walsh & Weidner Boiler Co., Chattanooga, Tenn.
Eureka Fire Brick Works, Pittsburgh, Pa.
McLeod & Henry Co., Troy, N. Y.

ARCHES, Fire Door
The Brady Conveyors Corp., 20 W. Jackson Blvd., Chicago, Ill.
Camden Fire Brick Co., Sixth & Everett Sts., Camden, N. J.
Casey-Hedges Co., Chattanooga, Tenn.
Eureka Fire Brick Works, Pittsburgh, Pa.
Liptak Fire-Brick Arch Co., Mexico, Mo.
McLeod & Henry Co., Troy, N. Y.
Steam Boiler Equipment Co., 1750 Monadnock Block, Chicago, Ill.
Titusville Iron Works Co., Titusville, Pa. See page 16.
Walsh & Weidner Boiler Co., Chattanooga, Tenn.

ARCHES, Flat Suspended
Brady Conveyor Corp. ("Brady"), 20 W. Jackson Blvd., Chicago, Illinois.
Casey-Hedges Co., Chattanooga, Tenn.
Chicago Tile Arch Furnace Co., 2600-10 W. Grand Ave., Chicago, Ill.
M. H. Detrick Co., 140 So. Dearborn St., Chicago, Ill.
Detroit Stoker Co., 340 General Motors Bldg., Detroit, Mich.
Edge Moor Iron Co., Edge Moore, Del.
Eureka Fire Brick Works, Pittsburgh, Pa.
Garlock Packing Co., 50 Main St., Palmyra, N. Y. See page 57.
The M. A. Hofft Co., 814 West Washington Ave., Indianapolis, Indiana
Laclede-Christy Clay Products Co., 1673 Railway Exchange Bldg., St. Louis, Mo.
Liptak Fire-Brick Arch Co., Mexico, Mo.
McLeod & Henry Co., Troy, N. Y.
Quinn & Co., 1347 Harrison Ave., Cincinnati, Ohio
Walsh & Weidner Boiler Co., Chattanooga, Tenn.

ARRESTERS, Lightning
General Electric Co., Schenectady, N. Y.

ASBESTOS PRODUCTS
Anchor Packing Co., 204-206 Lafayette Bldg., Philadelphia, Pa.
R. V. Aycock Co., 1522 Grand Ave., Kansas City, Mo.
Greene, Tweed & Co. ("Palmetto") 209 Duane St., New York, N. Y.
The Philip Carey Co., Lockland, Ohio
Central Asbestos & Magnesia Co., 214-216 W. Grand Ave., Chicago, Ill.
Darcoid Co., 1780 Broadway, New York, N. Y.
Ehret Magnesia Mfg. Co., Valley Forge, Pa.
Franklin Mfg. Co., Franklin, Pa.
Gasket Supply Co., 1729 Ludlow St., Philadelphia, Pa.
General Asbestos & Rubber Co. ("Garco"), Charleston, S. C.
Illinois Fire Proof Covering Co., Inc., 216 W. Kinzie St., Chicago, Ill.
Janos Asbestos Co., 26 Cortlandt St., New York, N. Y.
Johns-Manville, Inc., 292 Madison Ave., New York, N. Y.
Keasbey & Mattison Co., Ambler, Pa.
Keasbey, Robert A., Co., 445 West St., New York, N. Y.
Mikesell Bros. Co., 156 N. La Salle St., Chicago, Ill.
Nightingale & Childs Co., 205 Congress St., Boston, Mass.
Norristown Magnesia & Asbestos Co., Norristown, Pa.
Richards Mfg. Co., 325 Scribner Ave., Grand Rapids, Mich.
Sall Mountain Co., 230 S. La Salle St., Chicago, Ill.

BABBITT
Frictionless Metal Co., 1458-60 Collins St., St. Louis, Mo.

BABBITTING OUTFITS
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

BAFFLES, Refractory
Quigley Furnace Specialties Co., 26 Cortlands St., New York. See page 90.

BAFFLE, WALLS
Johns-Manville, Inc., Madison Ave. at 4th St., New York City

BALANCES, Analytical
Ainsworth, William, & Sons, 2151 Lawrence St., Denver, Colo.
The Emil Greiner Co., 55 Fulton St., New York City
Torsion Balance Co., 92 Reade St., New York, N. Y.

BALANCES, Spring
Dayton Scale Co., 448 Huffman Ave., Dayton, Ohio

BAROMETERS
A. S. Aloe Co., 513 Olive St., St. Louis, Mo.
Fort Worth Laboratories, 828½ Monroe St., Fort Worth, Texas See page 84.

BARRELS
Cleveland Steel Barrel Co., 9612 Meech Ave., Cleveland, Ohio.
Hirsch Cooperage & Steel Package Co., Houston, Texas
National Steel Barrel Co., 3860 E. 91st St., Cleveland, Ohio.
Peekin Cooperage Co., Port Arthur, Texas
The Refinery Supply Co., Fourth and Detroit Sts., Tulsa, Okla. See page 86.
Toledo Steel Barrel Co., Toledo, O.
Wilson & Bennett Mfg. Co., 6532 So. Menard Ave., Chicago, Ill.

BARS, Grate
Bass Foundry & Machine Co., Fort Wayne, Ind.
Bethlehem Steel Co., Machinery Dept., So. Bethlehem, Pa.
Botfield Refractories Co., Philadelphia, Pa.
Budd Grate Co., 2013 E. Letterly St., Philadelphia, Pa.
Canton Grate Co., 1711 Dillon Place, Canton, Ohio
Casey-Hedges Co., Chattanooga, Tenn.
Chickasaw Machine & Foundry Co., 298 No. Second St., Memphis, Tenn.
Delaney, P., Co., Newburgh, N. Y.
Dillon, D. M., Steam Boiler Wks., Fitchburg, Mass.
Ferguson, F., & Son, Clinton, Grand & Twelfth Sts., Hoboken, N. J.
Heath Grate Bar Co., 15 School St., Boston, Mass.
Hulson Grate Co. ("Hulson"), Keokuk, Iowa
Independent Foundry Co. ("Superior"), 743 York St., Portland, Oregon
Kewanee Boiler Co., Kewanee, Ill.
Kramer Bros. Foundry Co., 51 Dell St., Dayton, Ohio
Lombard Iron Works & Supply Co., Augusta, Ga.
McClave-Brooks Co., Scranton, Pa.
Mershon Patent Shaking Grate Works, 5750-52 Westminster Ave., Philadelphia, Pa.
Myerstown Foundry & Mfg. Co., 90 West St., New York, N. Y.
New England Roller Grate Co., Indian Orchard, Mass.
John O'Brien Boiler Works Co., 11th to 13th, Mullanphy to Howard St., St. Louis, Mo.
Pyramid Iron Products Corp., 2 Rector St., New York, N. Y.
Salamander Grate Bar Co., 126 Liberty St., New York, N. Y.
Service Foundry & Engineering Co., 333 Star Bldg., Washington, D. C.
Shear-Klean Grate Co., 810 Monadnock Bldg., Chicago, Ill.
Shevlin Engineering Co., Inc., 259 West 34th St., New York, N. Y.
St. John Grate Bar Co., The Bourse, Philadelphia, Pa.
Thomas Grate Bar Co., Birmingham, Ala.
Titusville Iron Works, Titusville, Pa. See page 16.
U. S. Cast Iron Pipe & Foundry Co., Burlington, N. J.

BARS, Reinforcing Concrete Work
Atlantic Steel Co., P. O. Box 1714, Atlanta, Ga.
Bethlehem Steel Co., Machinery Dept., So. Bethlehem, Pa.
Cambria Steel Co., 1628 Widener Bldg., Philadelphia, Pa.
Carnegie Steel Co., Carnegie Bldg., Pittsburgh, Pa.
Columbia Steel Co., 351 California St., San Francisco, Cal.
Concrete Steel Co., 42 Broadway, New York, N. Y.
Franklin Steel Wks., Franklin, Pa.
Oliver Iron & Steel Corp., So 10th & Muriel Sts., Pittsburgh, Pa.
Pollak Steel Co., Cincinnati, Ohio
Scully Steel & Iron Co., Chicago, Illinois
Youngstown Sheet & Tube Co., Youngstown, Ohio

BEAMS, Calite
The Calorizing Co., Pittsburgh, Pa.

BEAMS, Steel
Sculley Steel & Iron Co., Chicago, Ill.

BEAMS, Tube Still
The Calorizing Co., Pittsburgh, Pa.

BEARINGS
The Falls Clutch & Machinery Co., Cuyahoga Falls, Ohio
The Hill Clutch Machine & Foundry Co., Cleveland, Ohio
T. L. Walker, Houston, Texas

BEARINGS, Self-Oiling
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Tool & Machine Co., Boston, Mass.
Birmingham Iron Foundry, Derby, Conn.
Brown, A. & F. Co., 79 Barclay St., New York, N. Y.
Caldwell, H. W. & Son, Co., Seventeenth St. and Western Ave., Chicago, Ill.
Caldwell, W. E. Co., 342 E. Brandeis St., Louisville, Ky.
Colburn Gear & Mfg. Co., 56 Ranson Rd., Wollaston, Quincy. Mass.
Connellsville Mfg. & Mine Supply Co., Connellsville, Pa.
Dodge Mfg. Corp., Mishawaka Ind.
Farrel Foundry & Machine Co., Ansonia, Conn.
Jeffrey Mfg. Co., 904-99 North Fourth St., Columbus, Ohio
Link-Belt Co., 300 W. Pershing Road, Chicago, Ill.
Nordyke & Marmon Co., Indianapolis, Ind.
Steacy-Schmidt Mfg. Co., 120 Broadway, New York, N. Y.

BEARINGS, Self-Oiling, Adjustable
Webster Mfg. Co., 4500-4560 Cortland St., Chicago, Ill.
Weller Mfg. Co., 1820-1856 No. Kostner Ave., Chicago, Ill.

BELTING
Dick, R. & J. Co., Inc., Passaic, New Jersey
The Gandy Belting Co., 726-740 W Pratt St., Baltimore, Md.
Hercules Supply Co., Corsicana, Texas
The Republic Rubber Sales Co., 141-143 W. Austin Av., Chicago, Ill.

BELT DRESSING
Baltimore Belting Co., 23-25 So. Gay St., Baltimore, Md.
Beltine Chemical & Mfg. Co., 6155 Wentworth Ave., Chicago, Ill.
Black Bear Co., 138-44 Temple St., Long Island City, N. Y.
Bradford Belting Co., 202 Walnut St., Cincinnati, Ohio
Burr Oak Belting Co., 1103-07 York St., Cincinnati, Ohio
Chesapeake Belting Co., 812-823 Homewood Ave., Baltimore, Md.
Chesterton, A. W., Co., 64 India St., Boston, Mass.
Druid Oak Belting Co., 111 E. Lombard St., Baltimore, Md.
Duryea Mfg. Co., Ave C and Second St., Bayonne, N. J.
The Graton & Knight Mfg. Co., 356 Franklin St., Worcester, Mass.
Hartman & Wark, ("Hawko") 36 Warren St., New York, N. Y.
Ironsides Company, Columbus, O.
Jobbers Mfg. Co.. 327 So. La Salle St., Chicago, Ill.
McCauley Belting Co., 412-430 Orleans St., Chicago, Ill.
Meier's, Joseph Sons, 301 Market St., Newark, N. J.
Moloney Belting Co., 130 No. Franklin St., Chicago, Ill.
Mount Vernon Belting Co., 327-333 Warren Ave., Baltimore, Md.
O'Brien Northrup Oil & Chemical Co., St. Louis, Mo.
Palmer, N. & Co., Bridgeport, Conn.
Rahmann, Geo. & Co., 31 Spruce St , New York, N. Y.
Reed & Duecker, Memphis, Tenn.
Ruboil Belting Co., 1237 Market St., Philadelphia, Pa.
Schieren, Chas. A., Co., 30-38 Ferry St., New York, N. Y.
Standard Chemical Corp'n., Kalamazoo, Mich.
Stephenson Mfg. Co., P. O. Box 380, Albany, N. Y.
Ulmer Leather Co., Norwich, Conn
Victor Balata & Textile Belting Co., 38 Murray St., New York, N. Y.
Watt's, John M., Sons, 54 No. Second St., Philadelphia, Pa.

BELT TIGHTENERS
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Tool & Machine Co., Boston 9, Mass.
W. E. Caldwell Co., 342 E. Brandies St., Louisville, Ky.
Dodge Mfg. Corp., Mishawaka, Ind.
The Falls Clutch & Machinery Co., Cuyahoga Falls, Ohio
Hill Clutch Machine & Foundry Co., Foot of West 56th St., Cleveland, Ohio
Medart Company, St. Louis, Mo.
Wood's, T. B., Sons Co., Chambersburg, Pa.

BELTING, Balata
Bonner & Barnewall, 440 Lafayette St., New York City
R. & J. Dick Co., Passaic, N. J.
Victor Balata & Textile Belting Co., 38 Murray St., New York, N. Y.

BELTING, Camel Hair
Fenwick-Reddaway Co., Newark, N. J.
Rossendale-Reddaway Belting & Hose Co., Newark, N. J.

BELTING, Canvas
Bonner & Barnewall, 440 Lafayette St., New York City
Evansville Leather & Belting Co., 429-431 Sycamore St., Evansville, Indiana
The Gandy Belting Co., 726-740 W. Pratt St., Baltimore, Md.
Mt. Vernon Belting Co., 327-333 Warren Ave., Baltimore, Md.

BELTING, Conveyor
Chain Belt Co, Milwaukee, Wis.
R. & J. Dick Co., Passaic, N. J.
The Gandy Belting Co., 726-740 W. Pratt St., Baltimore, Md.
Goodyear Tire & Rubber Co., Akron, Ohio
Imperial Belting Co., 400 N. Lincoln St., Chicago, Ill.
Link Belt Co., 300 W. Pershing Road, Chicago, Ill.
Manhattan Rubber Mfg. Co., Passaic, N. J.
New York Belting & Packing Co., 91 Chambers St., New York, N. Y.
Quaker City Rubber Co., Wissinoming, Philadelphia, Pa.
United States Rubber Co., 17 90 Broadway, New York, N. Y.

BELTING, Cotton
Bonner & Barnewall, 440 Lafayette St., New York City
The Gandy Belting Co., 726-740 W. Pratt St., Baltimore, Md.
Mt. Vernon Belting Co., 327-333 Warren Ave., Baltimore, Md.
Rossendale-Reddaway Belting & Hose Co., Newark, N. J.
Stanley Belting Corp., 13 N. Jefferson St., Chicago, Ill.

BELTING, Elevator
The Gandy Belting Co., 726-740 W. Pratt St., Baltimore, Md.

BELTING, Leather
Bonner & Barnewall, 440 Lafayette, St., New York City.
Cross Bros. Co., Inc., 112-114 Mill St., Rochester, N. Y.
The Eagle Counter & Leather Co., 414 E. 8th St., Cincinnati, Ohio
Evansville Leather & Belting Co., 429-431 Sycamore St., Evansville, Ind.
The Graton & Knight Mfg. Co., 356 Franklin St., Worcester Mass.
Holyoke Belting Co., 66-68 Winter St., Holyoke, Mass.
Jewell Belting Co., Hartford, Conn.
Edward R. Ladew Co., 29 Murray St., New York, N. Y.
McCauley Belting Co., 412-430 Orleans St., Chicago, Ill.
McLanathan & Son, F. W., Lawrence, Mass.
Milwaukee Leather Belting Co., 146 W. Water St., Milwaukee, Wis.
Missouri Belting Co., 1021-1029 S. Grand Ave., St. Louis, Mo.
F. Raniville Co., Grand Rapids, Michigan
Rhoads, J. E., & Sons, 12 No. Third St., Philadelphia, Pa.
Schieren, Chas. A., Co., 30-38 Ferry St., New York, N. Y.
The W. H. Steigerwald Co., Inc., 617 Washington Ave., Houston, Texas
J. S. Turner Mfg. Co., 133 Middle St., Lowell, Mass.
I. B. Williams & Sons, Dover, N. H.
Witt, G. E., Co., 862-64 Howard St., San Francisco, Cal.

BELTING, Rubber
Anchor Packing Co., 204 Lafayette Bldg., Philadelphia, Pa.
Boston Woven Hose & Rubber Co., 29 Hampshire St., Cambridge, Mass.
The Diamond Rubber Co., Akron, Ohio
Evansville Leather & Belting Co., 429-431 Sycamore St., Evansville, Indiana
Goodyear Tire & Rubber Co., Akron, Ohio
Manhattan Rubber Mfg. Co., Passaic, N. J.
New York Belting & Packing Co., 91 Chambers St., New York, N. Y.
Pioneer Rubber Mills, 68 Sacramento St., San Francisco, Calif.
Quaker City Rubber Co., Wissinoming, Philadelphia.
Republic Rubber Co., Youngstown, Ohio
The W. H. Stiegerwald Co., Inc., 617 Washington Ave., Houston, Texas.
United States Rubber Co., 1790 Broadway, New York, N. Y.
Voorhees Rubber Mfg. Co., 20 to 56 Bostwick Ave., Jersey City, N. J.

BELTING, Silent Chain
Morse Chain Co., Ithaca, N. Y.

BELTING, Transmission
The Gandy Belting Co., 726-740 W. Pratt St., Baltimore, Md.

BELTING. Waterproof
R. and J. Dick Co., Passaic, N. J.
Goodyear Tire & Rubber Co., Akron, Ohio.
Jewell Belting Co., Hartford, Conn.
J. E. Rhoads & Sons, Wilmington Del.
United States Rubber Co., 1790 Broadway, N. Y.

BENDS, PIPE
E. B. Badger & Sons Co., 63 Pitts St., Boston, Mass.
Crane Co., 836 So. Michigan Ave., Chicago, Ill.
Grinnell Co., Providence, R. I.
Harrisburg Pipe & Pipe Bending Co. of Texas, Houston, Texas.
Kelly & Jones Co., Greensburg, Pa.
Ohio Steel Foundry Co., Springfield, Ohio.
Midwest Piping & Supply Co. 1450 S. Second St., St. Louis Mo.
Power Piping Co., 829 Beaver Ave., Pittsburgh, Pa.
Roessing Mfg. Co., Sharpsburg Station, Pittsburgh, Pa.
The Shaw-Kendall Eng. Co., 120 130 S. Superior St., Toledo, O
Henry Vogt Machine Co., Louisville, Ky. See page 34.
Walworth Mfg. Co., 142 High St., Boston, Mass.

BLOCKS, Asbestos
Rogers Asbestos Co., Houston Texas.
Johns-Manville, Inc., 292 Madison Ave., New York, N. Y.

BLOCKS, Chain Hoist
Chisholm & Moore Mfg. Co., 5040 Lakeside Ave., NE, Cleveland, O
Witt, G. E., Co., 862-64 Howard St., San Francisco, Calif.
Wright Manufacturing Co., Lisbon, Ohio.
Yale & Towne Mfg. Co., Stanford Conn.

BLOCK, Pillow
Jones, W. A., Foundry & Machine Co., 4415 W. Roosevelt Road, Chicago, Ill.

BLOWCASES, Automatic
Schutte & Koerting Co., Philadelphia, Pa. See page 39.

BLOWERS
Allen & Billmyre Co., Inc., Grand Central Palace, New York.
The Connersville Blower Co., Connersville, Ind.
The Green Fuel Economizer Co., Beacon, New York.
The P. H. & F. M. Roots Co., Chicago, Ill. See inside front cover.
Schutte & Koerting Co., Philadelphia. See page 39.

BLOWERS, Cast Iron
American Blower Co., Detroit, Michigan.

BLOWERS, Electric
Power Turbo-Blower Co., 45th St. and Madison Ave., New York City, N. Y.

BLOWERS, Exhaust
Electric Blower Co., 352 Atlantic Ave., Boston, Mass.

BLOWERS, Multi-Stage
Allen & Billmyre Co., Inc., Grand Central Palace, New York City.

BLOWERS, Oil Burner
Electric Blower Co., 352 Atlantic Ave., Boston, Mass.

BLOWERS, Pressure
Abbe Engineering Co., 50 Church St., New York City.
American Blower Co., Detroit, Mich.
American Gas Furnace Co., Spring and Lafayette Sts., Elizabeth, N. J.
Champion Blower & Forge Co., Lancaster, Pa.
De Laval Steam Turbine Co., Trenton, N. J. See page 58.
Kerr Turbine Co., Wellsville, N. Y.
Piqua Blower Co., Piqua, Ohio.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Terry Turbine Co., Hartford, Conn.

BLOWERS, Rotary Pressure
Beach-Russ Co., 46 Church St., New York City.

BLOWERS, Soot
Marion Machine, Foundry & Supply Co., Marion, Ind.
Nute, McGehee, Geary Co., Inc., Chambersburg, Pa.

BLOWERS, Steam Jet
Schutte & Koerting Co., 1165 Thompson St., Philadelphia, Pa. See page 39.

BLOWERS, Turbine
American Blower Co., Detroit, Mich.
Coppus Engineering Corp., 342-348 Park Ave., Worcester, Mass.
Kerr Turbine Co., Wellsville, N. Y.
Nute, McGehee, Geary Co., Inc., Chambersburg, Pa.
Power Turbo-Blower Co., 45th St. and Madison Ave., New York City.
Terry Steam Turbine Co., Hartford, Conn.

BLOWERS, Ventilating
Electric Blower Co., 352 Atlantic Ave., Boston, Mass.

BLUE PRINTING MACHINES
Williams, Brown & Earle (Inc.) 918 Chestnut St., Philadelphia, Pa. See page 88.

BOILERS
A. M. Lockett & Co., Houston, Texas.
American Gas Construction Co., Newton, Iowa.
Badenhausen Corp., 900 Victory Bldg., Philadelphia, Pa.
Gartner, F. W., Co., 3315 McKinney Ave., Houston, Texas.
The James Leffel & Co., Springfield, Ohio.
E. Leonard & Sons, London, Can.
Murray Iron Works Co., Burlington, Iowa.
Nagle Engine & Boiler Works, Erie, Pa.
Pioneer Tank & Boiler Co., Tulsa, Okla. See page 83.

Prospect Boiler Co., New Brunswick, N. J.
Southwestern Engineering Co., Inc. 90 West St., New York City. See page 49.

BOILERS, Baffles
Botfield Refractories Co., Philadelphia, Pa.
Engineer Co., 17 Battery Place, New York, N. Y.
Eureka Fire Brick Works, Pittsburgh, Pa.
Green, A. P., Fire Brick Co., Mexico, Mo.
Quigley Furnace Specialties Co., 26 Cortlandt St., New York, N. Y. See page 90.
Walsh & Weidner Boiler Co., Chattanooga, Tenn.

BOILERS, Fire Box
Ames Iron Works, Oswego, N. Y.

BOILERS, High Pressure
Fitzgibbons Boiler Co., Inc., 47 W. 42d St., New York City.

BOILERS, Low Pressure
Ames Iron Works, Oswego, N. Y.
Fitzgibbons Boiler Co., Inc., 47 W. 42nd St., New York City, N. Y.

BOILERS, Tubular Horizontal
Ames Iron Works, Oswego, N. Y.
Babcock-Wilcox & Goldie-McCulloch, Ltd., Galt, Ontario.
Brownell Co., Dayton, Ohio.
Brunswick-Kroeschell Co., Jersey Ave., New Brunswick, N. J.
Casey-Hedges Co., Chattanooga, Tenn.
D. Connelly Boiler Co., 1170 Ivanhoe Road, Cleveland, Ohio.
Davis, J. F., Harris Trust Bldg., Chicago, Ill.
Erie City Iron Works, Erie, Pa.
Farrar & Trefts, Inc., 67 Perry St., Buffalo, N. Y.
Kewanee Boiler Co., Kewanee, Ill.
Llewellyn Iron Works, Los Angeles, California.
Lucey Mfg. Corp., Woolworth Bldg., New York, N. Y.
Munroe & Sons Mfg. Corp., Twenty-third & Smallman Sts., Pittsburgh, Pa.
Murphy, John H., Iron Works, Magazine and Girod Sts., New Orleans, La.
John O'Brien Boiler Works Co., 11th to 13th Mullanphy to Howard St., St. Louis, Mo.
Oil Well Supply Co., Pittsburgh, Pa.
Paine, H. A., Houston, Texas.
Titusville Iron Works, Titusville, Pa. See page 16.
Henry Vogt Machine Co., Louisville, Ky. See page 34.
Walsh & Weidner Co., Chattanooga, Tenn.

BOILERS, Water Tube
Babcock-Wilcox and Goldie-McCulloch, Ltd., Galt, Ontario.
Indiana Air Pump Co., 816 Indiana Pythian Bldg., Indianoplis, Ind.
The George T. Ladd Co., First Nat. Bank Bldg., Pittsburgh, Pa.
Nagle Engine & Boiler Works, Erie, Pa.
John O'Brien Boiler Works Co., 11th to 13th Mullanphy to Howard St., St. Louis, Mo.
Page Boiler Co., 815 to 819 Larrabee St., Chicago, Ill.
Southwestern Engineering Corp., 1221 Hollingsworth Bldg., Los Angeles, Cal'f. See page 49.

BOLTS
Bethlehem Steel Co., Bethlehem, Pa.

BOLTS AND NUTS
U. T. Hungerford Brass & Copper Co., Lafayette, White & Franklin Sts., New York City.

BOLTS, Boiler
Sculley Steel & Iron Co., Chicago, Ill.

BOMBS AND GAUGES
Fort Worth Laboratories, 828½ Monroe St., Fort Worth, Texas. See page 84.

BOOSTERS, Gas
Allen & Billmyre Co., Inc., Grand Central Palace, New York City.
The Bessemer Gas Engine Co., Grove City, Pa.
C. & G. Cooper Co., Mt. Vernon, Ohio. See page 18.
The Connersville Blower Co., Connersville, Ind.
Clark Bros. Co., Olean, N. Y. See page 43.
James Howden & Co. of America, Inc., Wellsville, N. Y.
Ingersoll-Rand Co., 11 Broadway, New York, N. Y.
Miller Improved Gas Engine Co., Springfield, Ohio.
The P. H. & F. M. Roots Co., Chicago, Ill. See inside front cover.
Superior Gas Engine Co., Springfield, Ohio.

BOXES, Condensing
John Dollinger, Jr., Inc., Beaumont, Texas.
Kansas City Structural Steel Co., Kansas City, Kansas.
Pioneer Tank & Boiler Co., Tulsa, Okla. See page 83.
Joseph Reid Gas Engine Co., Oil City, Penna.
The Standard Boiler & Plate Iron Co., Niles, Ohio.
United Iron Works, Inc., Kansas City, Mo. See page 95.

BOXES, Cooling
John Dollinger, Jr., Inc., Beaumont, Texas.

BOXES, Junction
Harrisburg Pipe & Pipe Bending Co. of Texas, Houston, Texas.

BOXES, Knockout
Newton Process Mfg. Co., Fullerton, Calif.

BOXES, Look
Barnhart-Davis Company, Warren, Pa.
National Airoil Burner Co., 9th and Thompson Sts., Philadelphia, Pa.
The Oil Conservation Engineering Co., Cleveland, Ohio.
Jos. Reid Gas Engine Co., Oil City, Pa.
United Iron Works, Inc., Kansas City, Mo. See page 95.

BRASS GOODS
Garrott Brass & Machine Co., Houston, Texas.
U. T. Hungerford Brass & Copper Co., Lafayette, White & Franklin Sts., New York City.
Scovill Mfg. Co., Waterbury, Conn.
Southern Brass Mfg. Co., Houston, Texas.

BRASS, Sheet
Stamford Rolling Mills Co., Springdale, Conn.

BRAZING APPARATUS
Torchweld Equipment Co., 224 N. Carpenter St., Chicago, Ill.

BREECHINGS, Boiler
The Griscom-Russell Co., 92 West St., New York City. See page 9.

BREECHINGS, Smoke
Babcock & Wilcox Co., 85 Liberty St., New York, N. Y.
Brownell Co., Dayton, Ohio.
Casey-Hedges Co., Chattanooga, Tenn.
Heine Boiler Co., St. Louis, Mo.
Kewanee Boiler Co., Kewanee, Ill.
McAleenan Corp., Twenty-fifth and R. R. Sts., Pittsburgh, Pa.
John O'Brien Boiler Works Co., 11th to 13th Mullanphy to Howard St., St. Louis, Mo.
Titusville Iron Works Co., Titusville, Pa.
U. S. Cast Iron Pipe & Foundry Co., Burlington, N. J.
Henry Vogt Machine Co., Louisville, Ky. See page 34.
Walsh & Weidner Boiler Co., Chattanooga, Tenn.

BRICK
Acme Brick Company, Fort Worth, Texas.

BRICK, Chemical
Acme Brick Company, Fort Worth, Texas.

BRICK, Fire
Acme Brick Company, Fort Worth, Texas.
American Gas Construction Co., Newton, Iowa.
Armstrong Cork & Insulation Co., Pittsburgh, Pa.
Botfield Refractories Co., Philadelphia, Penna.
Chicago Retort & Fire Brick Co., 208 S. LaSalle Street, Chicago, Illinois.
Crescent Refractories Co., Curwensville, Clearfield Co., Pa.
The Denver Fire Clay Co., P. O. Box 1107, Denver, Colo
Eureka Fire Brick Works, Pittsburgh, Pa.
Flint Fire Brick Co., 5 Court Square, Long Island City, New York
Green, A. P., Fire Brick Co., Mexico, Mo.
Harbison-Walker Refractories Co., Farmers Bank Bldg., Pittsburgh, Pa.
Laclede-Christy Clay Products Co., 1673 Railway Exch. Bldg., St. Louis, Mo.
The Pyro Clay Products Co., Oak Hill, Jackson County, Ohio.
Queen's Run Refractories Co., Inc., Lock Haven, Pa.
The Refinery Supply Co., Fourth and Detroit Sts., Tulsa, Okla. See page 86.
Seaboard Refractories Co., Perth Amboy, N. J.
Southern Refractories Co., Fort Payne, Ala.
Wellsville Fire Brick Co., Wellsville, Mo.

BRICK, Insulating
Armstrong Cork & Insulation Co., Pittsburgh, Pa.
Celite Products Co., Los Angeles, Calif. See front cover.
Quigley Furnace Specialties Co., 26 Cortlandt St., New York. See page 90.
Johns-Mansville, Inc., 292 Madison Ave., New York, N. Y.

BULBS, Rectifiers
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

BURNERS, Boiler
N. C. Davison Gas Burner & Welding Co., 2939 Smallman St., Pittsburgh, Pa.

BURNERS, Furnace
N. C. Davison Gas Burner & Welding Co., 2939 Smallman St., Pittsburgh, Pa.

BURNERS, Gas
American Gas Furnace Co., Spring and Lafayette Sts., Elizabeth, N. J.
The Calorizing Co., Pittsburgh, Pa.
Chicago Flexible Shaft Co., 5600 Roosevelt Road, Chicago, Ill.
N. C. Davison Gas Burner & Welding Co., 2939 Smallman St., Pittsburgh, Pa.
Hugo Mfg. Co., West Duluth, Minn.
The Maxon Premix Burner Co., Belt Ry. & S. Mulberry St., Muncie, Ind.
Lee B. Metler Co., 406 S. Main St., Los Angeles, Calif. See page 88.

BURNERS, Gas and Oil Combined
Davison, N. C., Gas Burner & Welding Co., 2939 Smallman St., Pittsburgh, Pa.
The MacLeod Co., Bogen St., Cincinnati, Ohio.
Mettler, Lee B., Co., 634 San Fernando Bldg., Los Angeles, Calif. See page 88.

BURNERS, Laboratory
Eimer & Amend, 205 Third Ave., New York, N. Y.
Fort Worth Laboratories, 828½ Monroe St., Fort Worth, Texas. See page 84.

BURNERS, Low Pressure
National Airoil Burner Co., 9th & Thompson Sts., Philadelphia, Pa.

BURNERS, Oil
The Alexander Milburn Co., 1412-1428 W. Baltimore St., Baltimore, Md.
Babcock & Wilcox Co., 85 Liberty St., New York, N. Y.
The Maxon Premix Burner Co., Belt Ry. & S. Mulberry St., Muncie, Ind.
Morse Dry Dock & Repair Co., Brooklyn, New York.
Paine, H. A., Houston, Texas.
W. S. Ray Mfg. Co., 118 New Montgomery St., San Francisco, Calif.
Red-Top Oil Burner Co., 6644 Cottage Grove Ave., Chicago, Ill.
Schutte & Koerting Co., Philadelphia, Pa.
Todd Engr, & Oil Burner Corp., 742 E. 12th St., New York, N. Y.
Vogt Bros. Mfg. Co. 1402 W. Main St., Louisville, Ky.
Wilgus Mfg Co., 1722 E. 16th St., Los Angeles, Calif.
Witt, G. E. Co., 862-64 Howard St., San Francisco, Calif.

BURNERS, Oil High Pressure
National Airoil Burner Co., 9th & Thompson Sts., Phila., Pa.

BURNERS, Still
N. C. Davison Gas Burner & Welding Co., 2939 Smallman St., Pittsburgh, Pa.

BUSTERS, Rivet
May Machinery Co., Second Nat. Bank Bldg., Houston, Texas.

CALORIMETERS
American Schaeffer & Budenberg Corp., Berry & 5th Sts., Brooklyn, New York. See page 64.
Eimer & Amend, Third Ave, 18 to 19 St., New York City.
Griebel Instrument Co., Carbondale, Pa.

CANS
Moncrief-Lenoir Mfg. Co., Houston, Texas.

CAPS, Bubble
The Calorizing Co., Pittsburgh, Pa.

CAPS, Outlet
Barnhart-Davis Co., Warren, Pa.

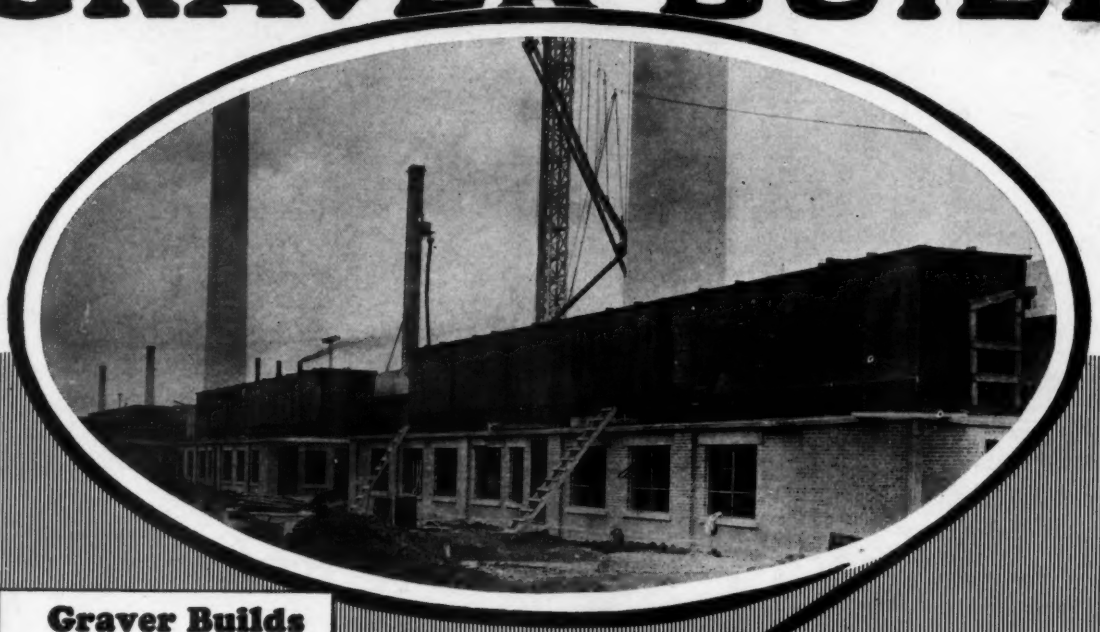
CARS, Tank
American Car & Foundry Co., 165 Broadway, New York, N. Y. See page 47.
Bethlehem Steel Co., Bethlehem, Pa.
Conley Tank Car Co., Pittsburgh, Pa.
General American Tank Car Co., Chicago, Ill. See page 92.
North American Car Co., 327 S. LaSalle St., Chicago, Ill. See page 96.
Pennsylvania Tank Car Co., Sharon, Pa.
Standard Tank Car Co., St. Louis, Mo.

CARS, Insulated
Conley Tank Car Co., Pittsburgh, Pa.

CASES, Blow
Kansas City Structural Steel Co., Kansas City, Kansas.

CASTINGS
American Steel Foundries, 410 Michigan Ave., Chicago, Ill.
Bethlehem Steel Co., Bethlehem, Pa.
A. W. Cadman Mfg. Co., Pittsburgh, Pa.
Driver-Harris Co., Harrison, N. J.
DeSoto Foundry & Mchy. Co., Mansfield, La.
Griscom-Russell Co., 94 West St., New York City.
Hercules Supply Co., Corsicana, Texas.
Llewellyn Iron Works, Los Angeles, Calif.
Maintenance Engineering Corp., 614 Second Nat. Bank Bldg., Houston, Texas. See page 95.
Mesta Machine Co., Pittsburgh, Pa.
Murray Iron Works Co., Burlington, Iowa.

GRAVER BUILT



Graver Builds

Tanks
Welded
Riveted
~~Riveted~~
(Riveted, Inside & Outside Welded)
Structural Supports
Tower Tanks
Standpipes
Any Size Tanks
Erected Anywhere

Refinery Equipment

Stacks-Breechings

General Steel Plate Construction

Water Softeners
Hot Process
Cold Process
Zeolite
Household

Filters
Pressure

Purifying Systems for Swimming Pools

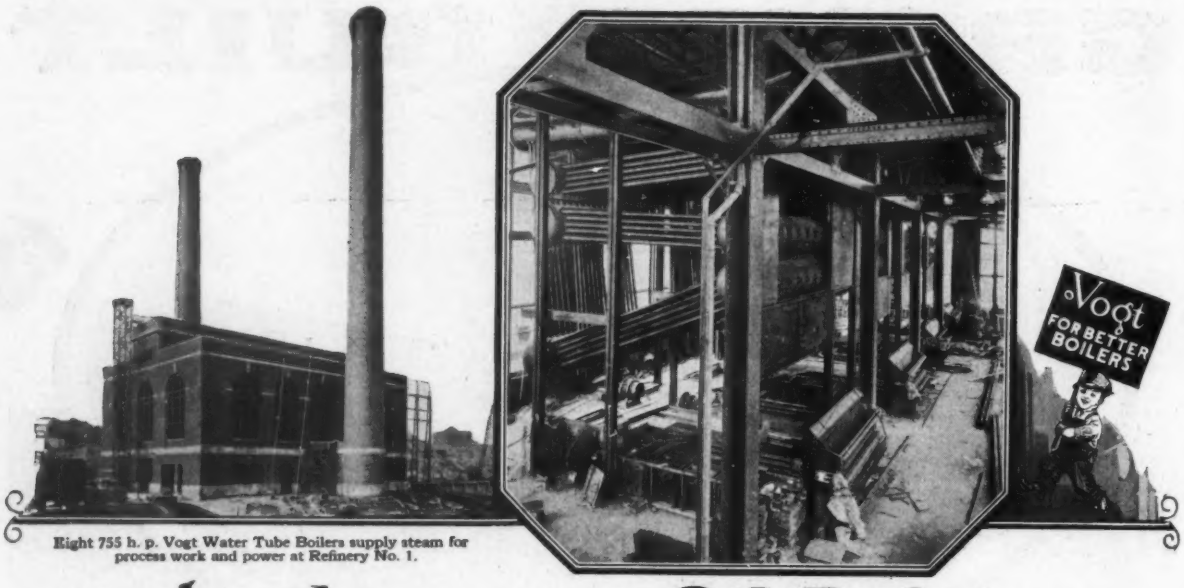
ABILITY TO BUILD—FACILITIES TO MEET DELIVERY PROMISES

This characterizes Graver's service to the refiner. Tanks—stills—condenser boxes—towers—agitators—water softeners—the Jenkins Cracking Process—are a few of the items built by Graver—both from special designs and Graver standards.

"If built of steel plate—Graver builds it" and delivers it on time.

GRAVER Corporation Founded 1857
EAST CHICAGO, INDIANA

NEW YORK Grand Cent. Term. | CHICAGO Steger Building | TULSA Atlas Life Bldg. | HOUSTON West Building



Eight 755 h. p. Vogt Water Tube Boilers supply steam for process work and power at Refinery No. 1.

Another great Oil Refiner has standardized upon Vogt WATER TUBE BOILERS

1st order on June 3, 1919, for	6—500 h. p. Vogt Boilers.....	= 3000 h. p.
2nd order on Aug. 11, 1922, for	2—500 h. p. Vogt Boilers.....	= 1000 h. p.
3rd order on Mar. 9, 1923, for	11—755 h. p. Vogt Boilers.....	= 8305 h. p.
4th order on June 25, 1923, for	1—755 h. p. Vogt Boiler	= 755 h. p.
	Total horse power of Vogt Boilers	13060 h. p.

These orders tell the story of the complete success of Vogt Water Tube Boilers at the refineries of this *large oil company. It is a story of efficient operation at high ratings, low maintenance cost, reliability and accessibility for cleaning.

The dates of the orders are significant. Three years elapsed between the first and second orders—sufficient time for thorough testing of the boilers and the elimination of the "guess work" still so common in the selection of water tube boilers.

Write for additional data and Bulletin WT-2.

*Customer has asked that name be given only upon special request.

HENRY VOGT MACHINE CO.

Incorporated

LOUISVILLE, KENTUCKY

NEW YORK · CHICAGO · PHILADELPHIA · DALLAS

Manufacturers of Water Tube and Return Tubular Boilers, Drop Forged Steel Valves and Fittings
Oil Refinery Equipment, Ice Making and Refrigerating Machinery

Tell them where you saw the ad

Ohio Steel Foundry Co., Springfield, Ohio. See page 41.
The Otis Steel Co., Cleveland, O.
Ross-Meehan Foundries, Chattanooga, Tenn.
Sivyer Steel Casting Co., Milwaukee, Wis.
Taylor-Wharton Iron & Steel Co., Highbridge, N. J.
Tips Foundry & Machine Co., Austin, Texas.

CASTINGS, Brass
Buckeye Iron and Brass Works, 310 East Third, Dayton, Ohio.
Hills-McCanna Co., 2025 W. Elston Ave., Chicago, Ill. See page 8.
Scovill Mfg. Co., Waterbury, Conn.
Southern Brass Mfg. & Plating Co., Houston, Texas.
The William Cramp & Sons Ship and Engine Building Co., Philadelphia, Pa.

CASTINGS, Bronze
Hills-McCanna Co., 2025 Elston Ave., Chicago, Ill. See page 8.
Hoyt Metal Co., 1506 Boatman's Bank Bldg., St. Louis, Mo.
Southern Brass Mfg. & Plating Co., Houston, Texas.
The William Cramp & Sons Ship and Engine Building Co., Philadelphia, Pa.

CASTINGS, Copper
Southern Brass Mfg. & Plating Co., Houston, Texas.

CASTING, Heat Resisting
Ohio Steel Foundry Co., Springfield, Ohio. See page 41.

CASTINGS, Tank Car
American Car & Foundry Co., 165 Broadway, New York, N. Y. See page 47.
American Steel Foundries, 410 Michigan Ave., Chicago, Ill.
Buckeye Steel Casting Co., Columbus, Ohio
Ohio Steel Foundry Co., Springfield, Ohio. See page 41.
Sivyer Steel Castings Co., Milwaukee, Wis.
Western Iron and Foundry Co., Wichita, Kansas

CEMENT
Texas Portland Cement Co., Santa Fe Bldg., Dallas, Texas

CEMENT, Acid Proof
Quigley Furnace Specialties Co., 26 Cortlandt St., New York. See page 90.

CEMENT, Asbestos
Barrett Co., 40 Rector St., New York, N. Y.
General Asbestos & Rubber Co., Charleston, S. C.
Johns-Manville, Inc., 292 Madison Ave., New York, N. Y.
Mikesell Bros. Co., 156 No. La Salle St., Chicago, Ill.
Standard Asbestos Mfg. Co., 820-822 West Lake St., Chicago, Ill.

CEMENT, Leather Belting
The Graton & Knight Mfg. Co., 356 Franklin St., Worcester, Mass.
McCauley Belting Co., 412-430 Orleans St., Chicago, Ill.
I. B. Williams & Sons, Dover, N. H.

CEMENT, Fire Brick
Celite Products Co., Van Nuys Bldg., Los Angeles, Calif. See front cover.
Eureka Fire Brick Works, Pittsburgh, Pa.
Green, A. P., Fire Brick Co., Mexico, Mo.
Laclede-Christy Clay Products Co., 1673 Railway Exchange Bldg., St. Louis, Mo.
Quigley Furnace Specialties Co., 26 Cortlandt St., New York. See page 90.

CEMENT, High Temp.
Botfield Refractories Co., Philadelphia, Pa.
Celite Products Co., Van Nuys Bldg., Los Angeles, Calif. See front cover.
Crescent Refractories Co., Curwensille, Clearfield Co., Pa.
The Denver Fire Clay Co., P. O. Box 1107, Denver, Colo.
Eureka Fire Brick Works, Pittsburgh, Pa.
Harbison-Walker Refractories Co., Farmers Bank Bldg., Pittsburgh, Pennsylvania
Johns-Mansville, Inc., Madison Ave., at 41st St., New York City
Laclede-Christy Clay Products Co., 1673 Railway Exchange Bldg., St. Louis, Mo.
Quigley Furnace Specialties Co., 26 Cortlandt St., New York, N. Y. See page 90.
Rogers Asbestos Co., Houston, Texas
Seaboard Refractories Co., Perth Amboy, N. J.

CENTRIFUGES
Eimer & Amend, Third Ave. 18 to 19 St., New York City
The Emil Greiner Co., 55 Fulton St., New York City
The Sharples Specialty Co., 23rd and Westmoreland Sts., Philadelphia, Pa.

CHAINS
Chain Belt Co., Milwaukee, Wis.
U. T. Hungerford Brass & Copper Co., Lafayette, White & Franklin Sts., New York City
Morse Chain Co., Ithaca, N. Y.
Scully Steel & Iron Co., Chicago, Illinois

CLAMPS, Pipe
Bethlehem Steel Co., Bethlehem, Pa.
Perfection Leak Closing Clamp Mfrs., 125 William St., Lockland, Ohio

CLARIFIERS, Gasoline
Bousman Mfg. Co., Inc., 1157-59 Plainfield Ave., N. E., Grand Rapids, Mich.

CLAY, Bleaching
Refineries Clay Co., 430 Story Bldg., Los Angeles, Cal.

CLAY, Fire
Crescent Refractories Co., Curwenville, Clearfield County, Pa.
The Denver Fire Clay Co., P. O. Box 1106, Denver, Colo.
Eureka Fire Brick Works, Pittsburgh, Pa.
Green, A. P., Fire Brick Co., Mexico, Mo.
Harbison-Walker Refractories Co., Farmers Bank Bldg., Pittsburgh, Pennsylania
Leclede-Christy Clay Products Co., 1673 Railway Exchange Bldg., St. Louis, Mo.
The Pyro Clay Products Co., Oak Hill, Jackson County, Ohio
Queen's Run Refractories Co., Inc., Lock Haven, Pa.
Seaboard Refractories Co., Perth Amboy, N. J.
Wellsville Fire Brick Co., Wellsville, Mo.

CLEANERS, Boiler Tube
Elliott Co., Jeannette, Pa.
Jarecki Mfg. Co., Erie, Pa.
Lagonda Mfg. Co., Springfield, O.
Liberty Mfg. Co., Pittsburgh, Pa. See page 6.
May Machinery Co., Second Nat. Bank Bldg., Houston, Texas
Rosedale Foundry & Machine Co., Columbus & Preble Ave., North Side, Pittsburgh, Pa.
Roto Company, Hartford, Conn. See page 92.
Ryerson, Joseph T., & Son, 16th and Rockwell Sts., Chicago, Ill.

CLEANERS, Flue
James L. Robertson & Sons, 78-80 Murray St., New York City, N. Y.
Underwood, H. B., Corp., 1015-1025 Hamilton St., Philadelphia, Pennsylvania
Witt, G. E., Co., 862-64 Howard St., San Francisco, Calif.

CLEANERS, Still Tube
Lagonda Mfg. Co., Springfield, O.
Liberty Mfg. Co., Pittsburgh, Pa. See page 6.
Roto Company, Hartford, Conn.

CLOCKS, Engine Room
American Schaeffer & Budenberg Corp., Berry & 5th Sts., Brooklyn, N. Y. See page 64.
Manning, Maxwell & Moore, Inc., 100 E. 42d St., New York City

CLOCKS, Watchman
Chicago Watchman's Clock Co., 1536 S. Wabash Ave., Chicago, Illinois

CLOTH, Wire
Edward J. Darby & Son, Inc., 317 Vine St., Philadelphia, Pa.
Newark Wire Cloth Co., 351-365 Verona Ave., Newark, N. J.
New Jersey Wire Cloth Co., Trenton, N. J.
Wickwire-Spencer Steel Corp., 41 East 42nd St., New York, N. Y.

CLOTH, Metallic Filter
Newark Wire Cloth Co., 351-365 Verona Ave., Newark, N. J.

CLUTCHES, Friction
Dodge Mfg. Co., Mishawaka, Ind
The Falls Clutch & Machinery Co., Cuyahoga Falls, Ohio
The Hill Clutch Machine & Foundry Co., Cleveland, Ohio
Jones, W. A., Foundry & Machine Co., 4415 W. Roosevelt Road, Chicago, Ill.
Medart Company, St. Louis, Mo.

CLUTCHES, Reverse
The Bessemer Gas Engine Co., Grove City, Pa. See page 5.
Marion Machine, Foundry & Supply Co., Marion, Ind.

COCKS
Manning, Maxwell & Moore, Inc., 100 E. 42d St., New York, N. Y.

COCKS, Air
Hills-McCanna, 2025 Elston Ave., Chicago, Ill. See page 8.
Jarecki Mfg. Co., Erie, Pa.
Kelly & Jones Co., Greensburg, Pa.
The Lunkenheimer Co., Cincinnati, Ohio
Walworth Mfg. Co., 142 High St., Boston, Mass.
D. T. Williams Valve Co., Spring Grove Ave. and Township St., Cincinnati, Ohio

COCKS, Drain
The Lunkenheimer Co., Cincinnati, Ohio. See page 14.

COCKS, Gauge
American Schaeffer & Budenberg Corp., Berry & 5th Sts., Brooklyn, N. Y. See page 64.
Buckeye Iron & Brass Works, 310 E. Third St., Dayton, Ohio
F. A. Burrows Mfg. Co., York, Pa.
A. W. Cadman Mfg. Co., Pittsburgh, Pa.
Crane Co., 836 So. Michigan Ave., Chicago, Ill.
Crosby Steam Gage & Valve Co., 40 Central St., Boston, Mass.
Detroit Lubricator Co., 5938 Trumbull Ave., Detroit, Mich.
Hills-McCanna, 2025 Elston Ave., Chicago, Ill. See page 8.
Jarecki Mfg. Co., Erie, Pa.
Jenkins Bros., 80 White St., New York, N. Y.
Kelly & Jones Co., Greensburg, Pa.
The Lunkenheimer Co., Cincinnati, Ohio. See page 14.
Pittsburgh Valve, Foundry & Construction Co., P. O. Box 1016, Pittsburgh, Pa.
Smith Separator Co., Tulsa, Okla.
Walworth Mfg. Co., 142 High St., Boston, Mass.
The Williams Gauge Co., Pittsburgh, Pa.
Williams, D. T., Valve Co., Spring Grove Ave. and Township St., Cincinnati, Ohio
Witt, G. E., Co., 862-64 Howard St., San Francisco, Calif.

COCKS, Oil
The Lunkenheimer Co., Cincinnati, Ohio. See page 14.
McDonald Mfg. Co., A. Y., Dubuque, Iowa. See back cover.

COCKS, Plug
Edward Soph, 124 W. 3rd St., Tulsa, Okla.

COCKS, Steam Stop
The Lunkenheimer Co., Cincinnati, Ohio. See page 14.

COILS
E. B. Badger & Sons Co., 63 Pitts St., Boston, Mass.
Chattanooga Boiler & Tank Co., Box 316, Chattanooga, Tenn.
Crane Co., 836 So. Michigan Ave., Chicago, Ill.
Grinnell Co., Providence, R. I.
The Griscom-Russell Co., 94 West St., New York City. See page 9.
Harrisburg Pipe and Pipe Bending Co., Harrisburg, Pa.
C. T. Hungerford Brass & Copper Co., Lafayette, White and Franklin St., New York City
Kelly & Jones Co., Greensburg, Pa.
Midwest Piping and Supply Co., 1450 S. 2nd St., St. Louis, Mo.
Power Piping Co., 829 Beaver Ave., Pittsburgh, Pa.
Roessing Mfg. Co., Sharpsville Station, Pittsburgh, Pa.
Superheater Co., 17 East 42nd St., New York, N. Y.
Henry Vogt Machine Co., Louisville, Ky. See page 34.
The Western Gas Construction Co., 1432 Buchanan St., Fort Wayne, Indiana
The Whitlock Coil Pipe Company, Hartford, Conn.
York Mfg. Co., York, Pa.

COILS, Oil Cracking
Superheater Co., 17 East 42nd St., New York, N. Y.

COLLARS
The Falls Clutch & Machinery Co., Cuyahoga Falls, Ohio
The Hill Clutch Machine & Foundry Co., Cleveland, Ohio

COLORIMETERS
Eimer & Amend, Third Ave. 18 to 19 St., New York City
The Denver Fire Clay Co., P. O. Box 1107, Denver, Colo.

COLUMNS, Packed
Southwestern Engineering Corp., 1221 Hollingsworth Bldg., Los Angeles, Calif. See page 49.
Southwestern Engineering Co., Inc., 90 West St., New York City. See page 49.

COLUMNS, Water
Crane Co., 836 So. Michigan Ave., Chicago, Ill.
Engineer Co. of Philadelphia, Harrison Bldg., Philadelphia, Pa.
Hills-McCanna Co., 2025 Elston Ave., Chicago, Ill. See page 8.
The Lunkenheimer Co., Cincinnati, Ohio. See page 14.
The Williams Gauge Co., Pittsburgh, Pa.

COMPOUNDS, Boiler
Botfield Refractories Co., Philadelphia, Pa.
Dixon, Joseph, Crucible Co., Jersey City, N. J.
Engineering Sup. Co., ("Lord's") 3307-11 No. 12th St., Philadelphia, Pa.
Hawk-Eye Compound Co., Blue Island, Ill.
Lake Erie Mfg. Co., Inc., 192-198 Chicago St., Buffalo, N. Y.
Paige & Jones Chemical Co., New York City
Perolin Co. of America, 2010 Peoples Gas Bldg., Chicago, Ill.

COMPOUNDS, Rust Inhibitive
Dearborn Chemical Co., 310 S. Michigan Ave., Chicago, Ill.

COMPRESSORS
American Gas Construction Co., Newton, Iowa
Chicago Pneumatic Tool Co., No. 6 E. 44th St., New York
De Laval Steam Turbine Co., Trenton, N. J.
Gardner Governor Co., 100 Williamson, Quincy, Ill.
Hope Engineering & Supply Co., Mt. Vernon, Ohio
Mesta Machine Co., Pittsburgh, Pa.
Schutte & Koerting Co., Philadelphia, Pa. See page 39.
Southern Engine & Pump Co., 615 Washington Ave., Houston, Tex.

COMPRESORS, Air
Allen & Billmyre Co., Inc., Grand Central Palace, New York City
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Bury Compressor Co., 1712 Cascade St., Erie, Pa.
Crowell Manufacturing Co., 319-321 Franklin Ave., Brooklyn, N. Y.
De Laval Steam Turbine Co., Trenton, N. J.
Erwin & Co., 3734-36 Cottage Grove Ave., Chicago, Ill.
Fairbanks-Morse & Co., 900 So. Wabash Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
James Howden & Co. of America, Inc., 830 Cunard Bldg., Wellsville, N. Y.
Hooven, Owens, Renthschler Co., Hamilton, Ohio
Hope Engineering & Supply Co., Mt. Vernon, Ohio
Ingersoll-Rand Co., 11 Broadway, New York City
May Machinery Co., Second National Bank Bldg., Houston, Tex.
National Steam Pump Co., Upper Sandusky, Ohio
Nordberg Mfg. Co., Milwaukee, Wis.
Novo Engine Co., Lansing, Mich.
Paine, H. A., Houston, Texas
Pennsylvania Pump & Compressor Co., Easton, Pa.
Perry, Harry M., 702 N. Main St., Los Angeles, Calif.
The P. H. & F. M. Roots Co., Chicago, Ill. See inside front cover.
Worthington Pump & Machinery Corp., 115 Broadway, New York, N. Y.

COMPRESSORS, Ammonia
Bury Compressor Co., 1712 Cascade St., Erie, Pa.
Frick Co., Inc., Waynesboro, Pa.
Ingersoll-Rand Co., 11 Broadway, New York, N. Y.
Vilter Mfg. Co., 1194 Clinton St., Milwaukee, Wis.
Henry Vogt Machine Co., Louisville, Ky. See page 34.
Worthington Pump & Machinery Corp., 115 Broadway, New York, N. Y.
York Mfg. Co., York, Pa.

COMPRESSORS, Centrifugal
De Laval Steam Turbine Co., Trenton, N. J. See page 58.

COMPRESSORS, Gas
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
The Bessemer Gas Engine Co., Grove City, Pa. See page 5.
Bury Compressor Co., 1712 Cascade St., Erie, Pa.
Chicago Pneumatic Tool Co., 6 East 44th St., New York, N. Y.
Clark Bros. Co., Olean, N. Y. See page 43.
Cooper, C. & G., Co., Mt. Vernon, Ohio. See page 18.
De Laval Steam Turbine Co., Trenton, N J. See page 58.
Frick Co., Inc., Waynesboro, Pa.
Hooven, Owens, Rentschler Co., Hamilton, Ohio
Hope Engineering & Supply Co., Mt. Vernon, Ohio
Howden, James, & Co. of America, Inc., 121 So. Maine St., Wellsville, N. Y.
Ingersoll-Rand Co., ("Ingersoll-Rand") ("Imperial") 11 Broadway, New York, N. Y.
Miller Improved Gas Engine Co., Springfield, Ohio
Nordberg Mfg. Co., Milwaukee, Wis.
Pattin Bros. Co., Marietta, Ohio
Sullivan Machinery Co., 122 S. Michigan Ave., Chicago, Ill.
Superior Gas Engine Co., Springfield, Ohio
P. H. and F. M. Roots Co., Connorsville, Ind. See inside front cover.
Vilter Mfg. Co., 1194-1196 Clinton St., Milwaukee, Wis. See page 95.
Worthington Pump & Machinery Corp., 115 Broadway, New York, N. Y.
York Mfg. Co., York, Pa.

COMPRESSORS, Gasoline Extraction
Bessemer Gas Engine Co., Grove City, Pa. See page 5.
Chicago Pneumatic Tool Co., 6 East 44th St., New York, N. Y.
Clark Bros. Co., Olean, N. Y. See page 43.
C. and G. Cooper Co., Mt. Vernon, Ohio
Gardner Governor Co., 100 Williamson, Quincy, Ill.
Hope Engineering and Supply Co., Mt. Vernon, Ohio
James Howden & Co. of America, Inc., Wellsville, N. Y.
Ingersoll-Rand Co., 11 Broadway, New York, N. Y.
Miller Improved Gas Engine Co., Springfield, Ohio
Superior Gas Engine Co., Springfield, Ohio
Worthington Pump & Machinery Corp., 115 Broadway, New York, N. Y.

CONDENSERS
American Gas Construction Co., Newton, Iowa
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Babcock-Wilcox & Goldie-McCulloch, Ltd., Galt, Ontario
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Biggs Boiler Works Co., Case Ave. & Newton St., Akron, Ohio
C. F. Braun & Co., Alhambra, Cal. See pages 52-53.
John Dollinger, Jr., Inc., Beaumont, Texas.
Frick Company, Inc., Waynesboro, Pa.
The Griscom-Russell Co., Monadnock Bldg., Chicago, Ill. See page 9.
Ingersoll-Rand Co., 11 Broadway, New York City
Kellogg, M. W., Co., 90 West St., New York, N. Y.
Mesta Machine Co., Pittsburgh, Pa.
Nordberg Mfg. Co., Milwaukee, Wis.
The Petroleum Iron Works Co. of Ohio, Sharon, Pa.
Ross Heater & Mfg. Co., Inc., 1107-11 West Ave., Buffalo, N.Y.
Schutte & Koerting Co., Philadelphia, Pa. See page 39.
Southwestern Engineering Co., 90 West St., New York City. See page 49.
Southwestern Engineering Corp., 1221 Hollingsworth Bldg., Los Angeles, Calif. See page 49.
Union Steam Pump Co., Battle Creek, Mich.
U. S. Cast Iron Pipe & Foundry Co., Burlington, N. J.
Vilter Mfg. Co., Milwaukee, Wis. See page 95.
Henry Vogt Machine Co., Louisville, Ky. See page 34.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Wheeler Condenser & Engineering Co., Carteret, N. J. See page 55.
C. H. Wheeler Mfg. Co., Philadelphia, Pa.
Worthington Pump & Machinery Corp., 115 Broadway, New York. N. Y.
York Mfg. Co., York, Pa.

CONDUITS, Electric
General Electric Co., Schenectady, N. Y.
Johns-Manville, Inc., 292 Madison Ave., New York, N. Y.

CONDUITS, Underground
General Electric Co., Schenectady, N. Y.
Johns-Manville, Inc., 292 Madison Ave., New York, N. Y.
The Rec-Will Co., Cleveland, O.

CONSISTOMETERS, Grease Testing
Eimer & Amend, Third Ave., 18 to 19 St., New York City.

CONTROL, Electrical
Barret, Haentjens & Co., Hazleton, Pa.
The Cutler-Hammer Mfg. Co., Milwaukee, Wis.
Sundh Electric Co., Inc., No. 5 Ave. C, Newark, N. J.

CONTROLLERS, Liquid Level
Chaplin-Fulton Mfg. Co., Pittsburgh, Pa.
Fisher Governor Company, Marshalltown, Iowa
Northern Equipment Co., Erie, Pa.

CONTROLLERS, Temperature
American Gas Furnace Co., Spring and Lafayette Sts., Elizabeth, N. J.
American Thermostat Co., New ark, N. J.
The Brown Instrument Co., Philadelphia, Pa.
The Denver Fire Clay Co., P. O. Box 1107, Denver, Colo.
Leeds & Northrup Co., Philadelphia, Pa.
The Refinery Supply Co., Fourth and Detroit Sts., Tulsa, Okla. See page 86.
Edward Soph, 124 W. 3rd St., Tulsa, Okla.
C. J. Tagliabue Mfg. Co., Brooklyn, N. Y. See page 56.
Taylor Instrument Co., Rochester, N. Y.

CONVEYORS, Ash
The Brady Conveyors Corp., 20 W. Jackson Blvd., Chicago, Ill.
Chain Belt Co., Milwaukee, Wis.
The Frederick Iron & Steel Co., Frederick, Md.

CONVEYORS, Pneumatic
The Brady Conveyors Corp., 20 W. Jackson Blvd., Chicago, Ill.

CONVEYORS, Rotary
Wesche, B. A., Electric Co., 1628 Vine St., Cincinnati, Ohio

COOLERS
Alberger Heater Co., 281-289 Chicago St., Buffalo, N. Y.
C. F. Braun & Co., Alhambra, Cal.
The Griscom-Russell Co., 90 West St., New York City, N. Y. See page 9.
Schutte & Koerting Co., Philadelphia, Pa. See page 39.
Southwestern Engineering Co., Inc,. 90 West St., New York City. See page 49.
Southwestern Engineering Corp., 1221 Hollingsworth Bldg., Los Angeles, Calif. See page 49.
Henry Vogt Machine Co., Louisville, Ky. See page 34.
The Whitlock Coil Pipe Co., Hartford, Conn.

COOLERS, Gas
Griscom-Russell Co., 814 Monadnock Bldg., Chicago, Ill. See page 9.

COOLING PONDS
Badger, E. B., & Sons, 63-75 Pitts St., Boston, Mass.
The Cooling Tower Co., Inc., 15 John St., New York City.
Carrier Engineering Corp., 750 Frelinghuysen Ave., Newark, N. J.
The Cooling Tower Co., Inc., 15 John St., New York
Spray Engineering Co., 60 High St., Boston, Mass.
The Whitlock Coil Pipe Co., Hartford, Conn.

COPPER GOODS
U. T. Hungerford Brass & Copper Co., Lafayette, White & Franklin St., New York City.
Stamford Rolling Mills Co., Springdale, Conn.

CORKS
Armstrong Cork & Insulation Co., Pittsburgh, Pa.
Fort Worth Laboratories, 828½ Monroe St., Ft. Worth, Texas. See page 84.

COUPLINGS
The Bruce-Macbeth Engine Co., Cleveland, Ohio
De Laval Steam Turbine Co., Trenton, N. J See page 58
The Falls Clutch & Machinery Co., Cuyahoga Falls, Ohio
The Frederick Iron & Steel Co., Frederick, Maryland
The Hill Clutch Machine & Foundry Co., Cleveland, Ohio
Jones, W. A., Foundry & Machine Co., 4415 Roosevelt Road, Chicago, Ill.
Mesta Machine Co., Pittsburgh, Pa.
P. H. & F. M. Roots Co., Chicago, Illinois See inside front cover.
The Terry Steam Turbine Co., Hartford, Conn.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

COVERS, Dome
Barnhart-Davis Co., Warren, Pa.
McDonald Mfg. Co., A. Y., Dubuque, Iowa. See back cover.

COVERS, Gauge, Thief Hole
The Oil Conservation Engineering Co., Cleveland, Ohio. See page 10.

COVERINGS, High Pressure
Armstrong Cork & Insulation Co., Pittsburgh, Pa.

COVERINGS, Pipe
Carey, Philip, Co., Cincinnati, O.
Ehret Magnesia Mfg. Co., Valley Forge, Pa.
Keasbey & Mattison Co., Ambler, Pa.
Norristown Magnesia & Asbestos Co., Norristown, Pa.
The Ric-Will Co., Cleveland, Ohio
Standard Asbestos Mfg. Co., 820-822 W. Lake St., Chicago, Ill.
Walworth Mfg. Co., 142 High St., Boston, Mass.

COVERINGS, Roof Manhole
The Oil Conservation Engineering Co., Cleveland, Ohio. See page 10.

CUTTERS, Tube
Sculley Steel & Iron Co., Chicago, Illinois

CUTTERS, Flue
Sculley Steel & Iron Co., Chicago, Illinois

CUPS, Grease
Detroit Lubricator Co., Detroit, Mich.
Jarecki Mfg. Co., Erie, Pa.
The Lunkenheimer Co., Cincinnati, Ohio. See page 14.
Penberthy Injector Co., Detroit, Mich.
Walworth Mfg. Co., 142 High St., Boston, Mass.

CUTTERS, Pipe
The Armstrong Mfg. Co., Bridgeport, Conn.
Greenfield Tap and Die Corp., Greenfield, Mass.
Reed Mfg. Co., Erie, Pa.
Trimont Mfg. Co., 55 Amory, Boston, Mass.

DAMPERS
American Blower Co., Detroit, Mich.

DEHYDRATING, Equipment
American Blower Co., Detroit, Mich.
DeLaval Separator Co., 165 Broadway, New York, N. Y.
The Sharples Specialty Co., 33rd and Westmoreland Sts., Philadelphia, Pa.

DEPHLEGMATORS
Griscom-Russell Co., 814 Monadnock Bldg., Chicago, Ill. See page 9.
Kansas City Structural Steel Co., Kansas City, Kansas
Newton Process Mfg. Co., Fullerton, Calif.
Southwestern Engineering Co., Inc., 90 West St., New York City. See page 49.
Southwestern Engineering Corp., 1221 Hollingsworth Bldg., Los Angeles, Calif See page 49.
Whitlock Coil Pipe Co., Hartford, Conn.

DETECTORS, Flow
Lewis Steam Specialty & Valve Co., 5145 Delancey St., Philadelphia, Pa.

DIE HEADS
The Cox & Sons Co., Water and Hampton Sts., Bridgeton, N. J.
Jarecki Mfg. Co., Erie, Pa.

Landis Machine Co., Waynesboro, Pa.
Standard Engineering Co., Elwood City, Pa.
Williams Tool Corp., Erie, Pa.

DISCS, Valve
Garlock Packing Co., Palmyra, N. Y. See page 57.
Goetze Gasket & Packing Co., New Brunswick, N. J. See page 98.
Metallo Gasket Co., 242 Lafayette St., New York City. See page 55.
The Strong Machinery & Supply Co., 21 Walker St., New York City
Witt, G. E., Co., 862-64 Howard St., San Francisso, Calif.

DISTILLATION, Apparatus
Central Scientific Co., 460 E. Ohio St., Chicago, Ill.
Eimer & Amend, Third Ave., 18 to 19 St., New York, N. Y.
Fort Worth Laboratories, 828½ Monroe St., Fort Worth, Texas See page 84.
Taylor Instrument Companies, Rochester, N. Y.

DOORS, Furnace
The Brady Conveyors Corp., 20 West Jackson Blvd., Chicago, Ill.

DRAFTING ROOM, Furniture
The H. Cole Co., 24 N. High St., Columbus, Ohio
The C. F. Pease Co., 813-821 N. Franklin St., Chicago, Ill.
Spaulding-Moss Co., 42 Franklin St., Boston, Mass.

DRAFTING, Apparatus
American Blower Co., Detroit, Mich.

DRAWING, Equipment
A. S. Aloe Co., 513 Olive St., St. Louis, Mo.
Economy Drawing Table & Mfg. Co., Adrian, Mich.
B. L. Makepeace, Inc., 387 Washington St., Boston, Mass.

DRYERS
American Blower Co., Detroit, Mich.
Bonnot Company, Canton, Ohio.
Carrier Engineering Corp., 750 Frelinghuysen Ave., Newark, N. J.

ECONOMIZERS
The Green Fuel Economizer Co., Beacon, New York
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

EDUCTORS
Schutte & Koerting Co., Philadelphia, Pa. See page 39.

EJECTORS
Blakeslee Mfg. Co., DuQuoin, Ill.
Erwin & Co., 3734-36 Cottage Grove Ave., Chicago, Ill.
Schutte-Koerting Co., 1165 Thompson St., Philadelphia, Pa. See page 39.

ENGINE, Gas
Advance Mfg. Co., N. W. Cor. B St. & Wayne Ave., Hamilton, Ohio
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
The Bessemer Gas Engine Co., Grove City, Pa. See page 5.
Bethlehem Steel Co., Bethlehem, Pa.
The Bruce-Macbeth Engine Co., 2111 Center St., Station "A," Cleveland, Ohio. See page 61.
Chicago Pneumatic Tool Co., 6 E. 44th St., New York City.
Clark Bros., Olean, N. Y. See page 43.
Cooper, C. & G., Co., Mt. Vernon, Ohio. See page 18.
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill.
The Foos Gas Engine Co., Springfield, Ohio
Franklin Valveless Engine Co., Franklin, Pa.
Hope Engineering & Supply Co., Mt. Vernon, Ohio
Hooven, Owens, Rentschler Co., Hamilton, Ohio
Ingersoll-Rand Co., 11 Broadway, New York City
Lucey Mfg. Co., Woolworth Bldg., New York, N. Y.
Marion Machine, Foundry & Supply Co., Marion, Ind.
Mesta Machine Co., Pittsburgh, Pennsylvania
Miller Improved Gas Engine Co., Springfield, Ohio
National Supply Cos., Toledo, O.
National Transit Pump & Machine Co., Oil City, Pa.
Oil Well Supply Co., Pittsburgh, Pa.
The Otto Engine Works, Philadelphia, Pa.
Pattin Brothers, Marietta, Ohio
Rathbun-Jones Engineering Co., Spencer St., Toledo, Ohio
Joseph Reid Gas Engine Co., Oil City, Pa.
Sullivan Machinery Co., 122 S. Michigan Ave., Chicago, Ill.
Superior Gas Engine Co., Springfield, Ohio
Titusville Iron Works Co., Titusville, Pa. See page 16.
Union Tool Co., Torrance, Calif.
Western Machinery Co., Los Angeles, Calif. See page 7.
Worthington Pump & Machinery Corp., 115 Broadway, New York. N. Y.

ENGINES, Gasoline
Advance Mfg. Co., N. W. Cor. B St. & Wayne Ave., Hamilton, O.
Climax Engineering Co., Clinton, Iowa
Cook Motor Co., Delaware, Ohio
The Hercules Corp., Evansville, Indiana
The Otto Engine Works, Philadelphia, Pa.
Universal Motor Co., Oshkosh, Wis.
Waukasha Motor Co., Waukasha Wis.

ENGINES, Oil
Babcock-Wilcox & Goldie-McCulloch, Ltd., Galt, Ontario
The Bessemer Gas Engine Co., Grove City, Pa.
Bethlehem Steel Company, Bethlehem, Pa.
De La Vergne Machine Co., 949 E. 138th St., New York City
The Falk Corp., Milwaukee, Wis.
Ingersoll-Rand Co., 11 Broadway, New York City
McIntosh & Seymour Corp., Auburn, N. Y.
National Transit Pump & Machine Co., Oil City, Pa.
Nordberg Mfg. Co., Milwaukee, Wis.
Otto Engine Mfg. Co., Philadelphia, Pa.
Power Mfg. Co., Marion, Ohio
Joseph Reid Gas Engine Co., Oil City, Pa.
Southern Engine & Pump Co., 615 Washington Ave., Houston, Tex
Superior Gas Engine Co., Springfield, Ohio
Tips Foundry & Machine Co., Austin, Texas
Titusville Iron Works, Titusville, Pa. See page 16.
Western Machinery Co., Los Angeles, Calif.

ENGINES, Steam
American Blower Co., Detroit, Mich.
Ames Iron Works, Oswego, N. Y.
Babcock-Wilcox & Goldie-McCulloch, Ltd., Galt, Ontario
Engberg's Electric & Mechanical Works, St. Joseph, Mich.
Erie Engine Works, Erie, Pa.
The James Leffel & Co., Springfield, Ohio
E. Leonard & Sons, London, Can.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

ENGINES, Hoist
Gartner, F. W., Co., 3315 McKinney Ave., Houston, Texas

ELIMINATORS, Oil
Hoppes Mfg. Co., 19 Larch St., Springfield, Ohio

EVAPORATORS
C. F. Braun & Co., Alhambra, Cal.
Newton Process Mfg. Co., Fullerton, Calif. See pages 52-53.
Schutte & Koerting Co., Philadelphia, Pa.
Southwestern Engineering Co., Inc., 90 West St. New York City. See page 49.
Southwestern Engineering Corp., 1221 Hollingsworth Bldg., Los Angeles, Calif. See page 49.

EXCHANGERS, Heat
C. F. Braun & Co., Alhambra, Cal. See pages 52-53.
John Dollinger, Jr., Inc., Beaumont, Texas
George Gibson H. Co., 100 Gold St., New York City
Griscom-Russell Co., 814 Monadnock Bldg., Chicago, Ill. See page 9.
Hope Engineering & Supply Co., Mt. Vernon, Ohio
Kansas City Structural Steel Co., Kansas City, Kansas
Newton Process Mfg. Co., Fullerton, Calif.
Pioneer Tank & Boiler Co., Tulsa, Okla.
Schutte & Koerting Co., Philadelphia. See page 39.
Southwestern Engineering Co., Inc., 90 West St., New York City. See page 49.
Southwestern Engineering Corp., 1221 Hollingsworth Bldg., Los Angeles, Calif. See page 49.
Henry Vogt Machine Co., Louisville, Ky. See page 34.
Wheeler Condenser & Eng. Co., 149 Broadway, New York, N. Y. See page 55.
The Whitlock Coil Pipe Co., Hartford, Conn.

EXHAUSTERS
Allen & Hillmyre Co., Inc., Grand Central Palace, New York City
American Gas Construction Co., Newton, Iowa
The Connersville Blower Co., Connersville, Ind.
The P. H. & F. M. Roots Co., Chicago, Ill. See inside front cover.
Schutte & Koerting Co., Philadelphia, Pa.

EXHAUST, Head
Paine, H. A., Houston, Texas

EXPANDERS. Boiler Tube
Richard Dudgeon, Inc., 24 and 26 Columbia St., New York City

EXTINGUISHERS, Fire
American Dyewood Co., 100 E 42nd St., New York, N. Y.
Barr, H. Edsil, Engineers, Erie, Pa.
Central Automatic Sprinkling Co., 5145-47 Delancey St., Philadelphia, Pa.
Foamite-Childs Corp., Utica, N. Y.
Globe Automatic Sprinkler Co., 2035 Washington Ave., Philadelphia, Pa.
New England Fire Appliance Co., 9 Broad St., Boston, Mass.
The Oil Conservation Engineering Co., Cleveland, Ohio. See page 10.
Western Fire Engineers, 223 Higgins Bldg., Los Angeles, Calif.

EXTRACTORS, Grease
C. F. Braun & Co., Alhambra, Cal. See pages 52-53.
The Griscom-Russell Co., 94 West St., New York City. See page 9.

FAUCETS, Barrel
Chicago Faucet Co., Chicago, Ill.
Cleveland Brass Mfg. Co., Cleveland, Ohio
Cooke, Geo. W., Co., Brooklyn, N. Y.
A. Y. McDonald Mfg. Co., Dubuque, Iowa. See back cover.
Merit Oil Equipment Co., Cleveland, Ohio
Morrison Bros., Dubuque, Iowa
Powell, Wm., Co., Cincinnati, Ohio

FEEDERS, Boiler
Northern Equipment Co., Erie, Pa.
Farnsworth Co., Norristown, Pa.

FEEDERS, Boiler Compound
Fisher Governor Co., Marshalltown, Iowa
Hills-McCanna Co., 2025 Elston Ave., Chicago, Ill. See page 8.
Lake Erie Mfg. Co., Inc., 192-198 Chicago St., Buffalo, N. Y.
Taber Pump Co., 291 Elm St., Buffalo, N. Y.

BOILER FEED UNITS, Centrifugal
Byron Jackson Pump Mfg. Co., 412 S. San Pedro St., Los Angeles, Calif.

FENCE
Texas Cyclone Fence Co., 1316 E. Frant St., Ft. Worth, Texas
Columbia Fence & Wire Co., 3120 Grand Ave., Dallas, Texas
Bethlehem Steel Co., Bethlehem, Pa.

FILTERS, Oil
The Griscom-Russell Co., 90 West St., New York City. See page 9.
Kansas City Structural Steel Co., Kansas City, Kansas
Biggs Boiler Works Co., Case Ave., and Newton St., Akron, O.
Bousman Mfg. Co., Inc., 1157-59 Plainfield Ave., N. E., Grand Rapids, Mich.
Bowser, S. F., & Co., Inc., 1230 Bowser Ave., Fort Wayne, Ind.
Burt Mfg. Co., Akron, Ohio.
De Laval Separator Co., 165 Broadway, New York, N. Y.
Wm. W. Nugent & Co., 410-412 N. Hermitage Ave., Chicago, Ill.

FILTERS, Water
Biggs Boiler Works Co., Case Ave., and Newton St., Akron, Ohio
Casey-Hedges Co., Chattanooga, Tenn.
H. S. B. W. Cochrane Corp., 3130 No. 17th St., Philadelphia, Pa.
Graver Corp., 414 Todd Ave., E. Chicago, Ill. See pages 3-33.
International Filter Co., 335 W. 25th Place, Chicago, Ill.
Paine, H. A., Houston, Texas
The Plouff Corp., Boston, Mass.
Power Plant Specialty Co., 440 S. Dearborn St., Chicago, Ill.
Wm. B. Scaife & Sons Co., Oakmont, Pa.
Schutte & Koerting Co., Philadelphia. See page 39.

FIREPROOFING MATERIALS
Johns-Mansville, Inc., Madison Ave. at 41st St., New York City

FIRST AID SUPPLIES
Frank S. Betz Co., Hammond, Ind.

FITTINGS, Cast Iron
American Cast Iron Pipe Co., Birmingham, Ala.
Clow, James B., & Sons, 534 S. Franklin St., Chicago, Ill.
Essex Foundry, Newark, N. J.
Harrisburg Pipe and Pipe Bending Co., Houston, Texas

FITTINGS, Cast Steel
Limbert, Geo. B., & Co., 570 Fulton St., Chicago, Ill.
Ohio Steel Foundry Co., Springfield, Ohio. See page 41.

FITTINGS, Drop-Forged
The Hydraulic Press Mfg. Co., Mt. Gilead, Ohio
Vogt, Henry, Machine Co., Louisville, Ky. See page 34

FITTINGS, Flanged
Clow, James B., & Sons, 534 So. Franklin St., Chicago, Ill.
Crane Co., 836 So. Michigan Ave., Chicago, Ill.
Essex Foundry, Newark, N. J.
Jarecki Mfg. Co., Erie, Pa.
Kelly & Jones Co., Greensburg, Pa.
Pittsburgh Valve Foundry & Construction Co., P. O. Box 1016, Pittsburgh, Pa.
The Shaw-Kendall Engineering Co., 120-130 S. Superior St., Toledo, Ohio
U. S. Cast Iron Pipe & Foundry Co., Burlington, N. J.
Walworth Mfg. Co., 142 High St., Boston, Mass.

FITTINGS, Flanged Steel
Crane Co., 836 So. Michigan Ave., Chicago, Ill.
Kelly & Jones Co., Greensburg, Pa.

Ohio Steel Foundry Co., Springfield, Ohio
Pittsburgh Valve Foundry & Construction Co., P. O. Box 1016, Pittsburgh, Pa.
Power Piping Co., Beaver St., and Western Ave., Pittsburgh, Pa.
Reading Steel Casting Co., Inc., Bridgeport, Conn.
Walworth Mfg. Co., 142 High St., Boston, Mass.

FITTINGS, Hydraulic
Bethlehem Steel Co., Bethlehem, Penn.
Buckeye Iron & Brass Works, 310 E. Third St., Dayton, Ohio
Crane Co., 836 So. Michigan Ave., Chicago, Ill.
Jarecki Mfg. Co., Erie, Pa.
Kelly & Jones Co., Greensburg, Penn.
Pittsburgh Valve Foundry & Construction Co., P. O. Box 1016, Pittsburgh, Pa.
Reading Steel Casting Co., (Inc.), Bridegport, Conn.
U. S. Cast Iron Pipe & Foundry Co., Burlington, N. J.
Walworth Mfg. Co., 142 High St., Boston, Mass.

FITTINGS, Long Sweep
Essex Foundry, Newark, N. J.

FITTINGS, Malleable, Screwed
Clow, James B., & Sons, 534 So. Franklin St., Chicago, Ill.
Jarecki Mfg. Co., Erie, Pa.
Kelly & Jones Co., Greensburg, Penn.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Pittsburgh Valve & Fitting Co., Barberton, Ohio
Walworth Mfg. Co., 142 High St., Boston, Mass.

FITTINGS, Pipe
Clow, James B., & Sons, 534 So. Franklin St., Chicago, Ill.
Crane, Co., 836 So. Michigan Ave., Chicago, Ill.
Essex Foundry, Murray St. and Avenue D., Newark, N. J.
Hope Engineering & Supply Co., Mt. Vernon, Ohio
Illinois Malleable Iron Co., 1801-1825 Diversey Parkway, Chicago, Ill.
Jarecki Mfg. Co., Erie, Pa.
Jefferson Union Co., Lexington, Mass.
Kelly & Jones Co., Greensburg, Pa.
Lunkenheimer Company, Cincinnati, Ohio. See page 14.
Malleable Iron Fittings Co., Branford, Conn.
National Supply Cos., Toledo, O.
Ohio Steel Foundry Co., Springfield, Ohio. See page 41.
Pittsburgh Valve Foundry & Construction Co., P. O. Box 1016, Pittsburgh, Pa.
Powell, Wm., Co., Cincinnati, O.
U. S. Cast Iron Pipe & Foundry Co., Burlington, N. J.
Walworth Mfg. Co., 142 High St., Boston, Mass.

FITTINGS, Pipe Line
National Transit Pump & Machine Co., Oil City, Pa.

FITTINGS, Steam
Essex Foundry, Newark, N. J.

FITTINGS, Steel
Buckeye Iron & Brass Works, 310 E. Third St., Dayton, Ohio
Crane Co., 836 So. Michigan Ave., Chicago, Ill.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio
Kelly & Jones Co., Greensburg, Pa.
Maintenance Engineering Corp., 614 National Bank Bldg., Houston, Texas
Malleable Iron Fittings Co., Branford, Conn.
Ohio Steel Foundry Co., Springfield, Ohio. See page 41.
Pittsburgh Valve, Foundry & Construction Co., P. O. Box 1016, Pittsburgh, Pa.
Reading Steel Casting Co., (Inc.), Bridgeport, Conn.
Vogt, Henry, Machine Co., Louisville, Ky. See page 34.
Walworth Mfg. Co., 142 High St., Boston, Mass.

FITTINGS, Union
Crane Co., 836 So. Michigan Ave., Chicago, Ill.
Dart, E. M., Mfg. Co., 134 Thurbers Ave., Providence, R. I.
Jarecki Mfg. Co., Erie, Pa.
Jefferson Union Co., Lexington, Mass.
Kelly & Jones Co., Greensburg, Pa.
Walworth Mfg. Co., 142 High St., Boston, Mass.

FLANGES
Essex Foundry, Newark, N. J.
The Lukenheimer Co., Cincinnati, Ohio. See page 14.
The Shaw-Kendall Engineering Co., 120-130 S. Superior St., Toledo, Ohio

FLANGES, Cast Iron
Crane Co., 836 So. Michigan Ave., Chicago, Ill.
Davis & Farnum Engineering Works, Inc., Waltham, Mass.
Essex Foundry, Murray St., and Avenue D., Newark, N. J.
Grinnell Co., Providence, R. I.
Jarecki Mfg. Co., Erie, Pa.
Jenkins Bros., 80 White St., New York, N. Y.
Kelly & Jones Co., Greensburg, Pa.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Limbet, George B. & Co., 570 Fulton St., Chicago, Ill.
Pittsburgh Valve, Foundry & Construction Co., P. O. Box 1016, Pittsburgh, Pa.
Powell, Wm., Co., Cincinnati, Ohio
Walworth Mfg. Co., 142 High St., Boston, Mass.

FLANGES, Cast Steel
Jenkins Bros., 80 White St., New York, N. Y.
Kelly & Jones Co., Greensburg, Pa.
Pittsburgh Valve, Foundry & Construction Co., P. O. Box 1016, Pittsburgh, Pa.
Powell, Wm., Co., Cincinnati, Ohio
Reading Steel Casting Co., Inc., Bridgeport, Conn.
Vogt, Henry, Machine Co., Louisville, Ky. See page 34.
Walworth Mfg. Co., 142 High St., Boston, Mass.

FLANGES, Floor
Essex Foundry, Newark, N. J.

FLANGES, Forged Steel
Bethlehem Steel Co., Bethlehem, Pa.
Cann & Saul Steel Co., 516 Commerce St., Philadelphia, Pa.
Crane Co., 836 Michigan Ave., Chicago, Ill.
The Edward Valve & Mfg. Co., East Chicago, Indiana
Jenkins Bros., 80 White St., New York, N. Y.
Pittsburgh Valve, Foundry & Construction Co., P. O. Box 1016, Pittsburgh, Pa.
Ryerson, Joseph T., & Son, Sixteenth and Rockwell Sts., Chicago, Ill.
Sculley Steel & Iron Co., Chicago, Ill.
Walworth Mfg. Co., 142 High St., Boston, Mass.
Williams, J. H., & Co., 150 Hamilton Ave., Brooklyn, N. Y.

FLANGES, Welding
Bonney Forge & Tool Works, Allentown, Penn.

FLUES, Boiler
American Iron Works, Louisville, Ky.

FORGES
Champion Blower & Forge Co., Lancaster, Pa.
Chicago Flexible Shaft Co., 5600 Roosevelt Road, Chicago, Ill.

FORGES, Rivet
Chicago Flexible Shaft Co., 5600 Roosevelt Road, Chicago, Ill.
Hauck Mfg. Co., 126-134 10th St., Brooklyn, New York

FORGINGS
Bethlehem Steel Co., Bethlehem, Pa.
Bonney Forge & Tool Works, Allentown, Pa.
Champion Machine & Forging Co., 3695 East Seventy-eighth St, Cleveland, Ohio
Heppenstall Forge & Knife Co., 46 and Hatfield Sts., Pittsburgh, Pa.
The Hill Clutch Machine & Foundry Co., Cleveland, Ohio
Mesta Machine Co., Pittsburgh, Pa.
Ed. Schwartz Mill Supply Co., New Orleans, La.
Tioga Steel & Iron Co., 52d St., and Grays Ave., Philadelphia, Pa.

FORGINGS, Hollow
Harrisburg Pipe & Pipe Bending Co., Harrisburg, Pa.
William Wharton Jr. & Co., Inc., Easton, Pa.

FORMS, Concrete
The Berger Mfg. Co., Canton, O.

FRACTIONATORS
Southwestern Engineering Corp., 1221 Hollingsworth Bldg., Los Angeles, Calif. See page 49.

FRONTS, Still
Barnhart-Davis Co., Warren, Pa.

FURNACES
The Denver Fire Clay Co., P. O. Box 1107, Denver, Colo.
James McMillan & Co., 114 Clarkson St., Chicago, Ill.
John O'Brien Boiler Works Co., 11th to 13th Mullanphy to Howard St., St. Louis, Mo.
Paine, H. A., Houston, Texas
Riley, Sanford Stoker Co., Worcester, Mass.
St. John Grate Bar Co., 66-68-70 Chancery Lane, Philadelphia, Pa.

FURNACES, Boiler
Casey-Hedges Co., Chattanooga, Tenn.
Laclede-Christy Clay Products Co., 1673 Railway Exchange Bldg., St. Louis, Mo.
Walsh & Weidner Boiler Co., Chattanooga, Tenn.

GASKETS
Edison Packing & Sales Co., 234 State St., Boston, Mass.
General Asbestos & Rubber Co., Charleston, S. C.
Goetze Gasket & Packing Co., New Brunswick, N. J.
Metallo Gasket Co., 242 Lafayette St., New York City
Stewart R. Browne Mfg. Co., New York, N. Y.
The Strong Machinery & Supply Co., 21 Walker St., New York, N. Y.
U. S. Indestructible Gasket Co., 829 E. 15th St., Brooklyn, N. Y.

GASKETS, Air
Metallo Gasket Co., 242 Lafayette St., New York City

GASKETS, Aluminum
McCord Radiator & Mfg. Co., Detroit, Mich.

GASKETS, Asbestos
Garlock Packing Co., Palmyra, N. Y.
Witt, G. E. Co., 862-64 Howard St., San Francisco, Cal.
Metallo Gasket Co., 242 Lafayette St., New York City
McCord Radiator & Mfg. Co., Detroit, Mich.

GASKETS, Boiler
McCord Radiator & Mfg. Co., Detroit, Mich.

GASKETS, Cork
The Booth Felt Co., 463-473 19th St., Brooklyn, N. Y.

GASKETS, Corrugated Copper
McCord Radiator & Mfg. Co., Detroit, Mich.
United States Mineral Wool Co., 280 Madison Ave., New York, N. Y.

GASKETS, Felt
The Booth Felt Co., Inc., 463-473 19th St., Brooklyn, N. Y.

GASKETS, Handhole
Metallo Gasket Co., 242 Lafayette St., New York City
Rogers Asbestos Co,, Houston, Texas

GASKETS, Metal
Brandt, Randolph, 66 Cortlandt St., New York, N. Y.
Garlock Packing Co., Palmyra, New York
Metallo Gasket Co., 242 Lafayette St., New York City
McCord Radiator & Mfg. Co., Detroit, Mich.

GASKETS, Manhole
Metallo Gasket Co., 242 Lafayette St., New York City
McCord Radiator & Mfg. Co., Detroit, Mich.

GASKETS, Oil
Metallo Gasket Co., 242 Lafayette St., New York City

GASKETS, Paper
The Booth Felt Co. Inc., 463-473 19th St., Brooklyn, N. Y.

GASKETS, Rubber
Garlock Packing Co., Palmyra, N. Y.
Voorhees Rubber Mfg. Co., 20 to 56 Bostwick Ave., Jersey City, N. J.

GASKETS, Steam
Metallo Gasket Co., 242 Lafayette St., New York City

GASKETS, Vulcanized Fibre
National Vulcanized Fibre Co., Wilmington, Delaware

GAUGES
Ashcroft Manufacturing Co., New York, N. Y.
The Foxboro Co. Inc., Foxboro, Mass.
International Filter Co., 333 W. 25th Place, Chicago, Ill.
J. E. Lonergan Co., 211-215 Race St., Philadelphia, Pa.
Manning, Maxwell & Moore, Inc., 100 E. 42nd St., New York City
The Refinery Supply Co., Fourth and Detroit Sts., Tulsa, Okla.
Witt, G. E., Co., 862-64 Howard St., San Francisco, Cal.

GAUGES, Air
United States Gauge Co., 44 Beaver St., New York City

GAUGES, Ammonia
Ashton Valve Co., 161 First St., Cambridge, Boston, Mass.
Bailey Meter Co., 2009 E. Forty-sixth St., Cleveland, Ohio
Crosby Steam Gauge & Valve Co., 40 Central St., Boston, Mass.

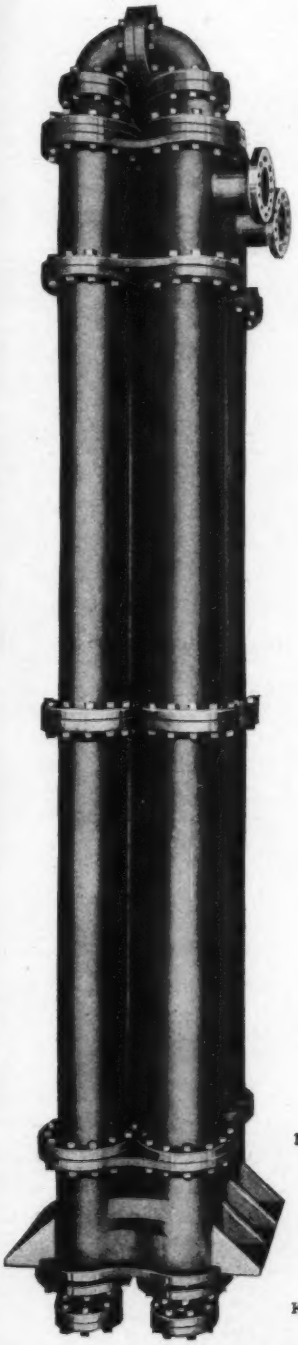
GAUGES, Draft
Bailey Meter Co., 2009 E. 46th St., Cleveland, Ohio
Bristol Co., Waterbury, Conn.
The Brown Instrument Co., Philadelphia, Penn.
Crosby Steam Gauge & Valve Co., 40 Central St., Boston, Mass.
Defender Automatic Regulator Co., St. Louis, Mo.
Ellison, Lewis M., 214 W. Kinzie St., Chicago, Ill.
The Jos. W. Hays Corp., Michigan City, Ind.
Meriam Co., 8405 Detroit Ave., Cleveland, Ohio
The Refinery Supply Co., Tulsa, Okla.

GAUGES, Indicating
The Refinery Supply Co., Tulsa, Okla.

GAUGES, Oil
United States Gauge Co., 44 Beaver St., New York City

GAUGES, Pressure
American Schaeffer & Budenberg Corp., Berry & South 5th Sts., Brooklyn, N. Y.
Ashton Valve Co., 161 First St., Cambridge, Mass.

Heat means Fuel and Fuel means Money



Especially in the "cracking processes" are Heat Exchangers economical as hot oil can be used to heat the crude coming into the stills.

Therefore

the **recovery of waste heat** in refining processes is justified by the actual **reduction in operating costs.**

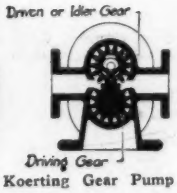
SCHUTTE KOERTING

HEAT EXCHANGERS

are built in single and multiple-barrel types to meet requirements in refining various grades of crude.

Inquiries should mention kinds of oil and residue to be handled, temperatures, densities, viscosities and all data of similar nature.

Large Capacities—Small Upkeep Charges
Maximum Heat Transfer
Minimum Pressure Loss
Vapor Condensers—Oil Heaters—Coolers



Koerting Gear Pump

Ask Heat Transfer Dept. for Bulletin 12-H describing S & K Heat Exchangers

Schutte Steel Valve

SCHUTTE & KOERTING CO.

1253 N. 12th Street, Philadelphia, Pa.

Bristol Co., Waterbury, Conn.
The Brown Instrument Co., Philadelphia, Pa.
Foxboro Co., Foxboro, Mass.
The Jos. W. Hays Corp., Michigan City, Indiana
Pneumercator Co. Inc., 40 Flatbush Avenue Extension, Brooklyn, N. Y.
Tagliabue, C. J. Mfg. Co., 18-88 33rd St., Brooklyn, N. Y.
Taylor Instrument Cos., Rochester, N. Y.
United States Gauge Co., 44 Beaver St., New York City
Wagner, Carl H., 1944 N. Albany Ave., Chicago, Ill.

GAUGES, Safety
Northern Tool Co. Inc., 806 Union St., Utica, N. Y.

GAUGES, Liquid Level
Bristol Co., Waterbury, Conn.
The Foxboro Co. Inc., Foxboro, Mass.
The Lunkenheimer Co., Cincinnati, Ohio

GAUGES, Mercury Tank
Pneumercator Co. Inc., 40 Flatbush Avenue Extension, Brooklyn, N. Y.

GAUGES, Vacuum Recording
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., Waterbury, Conn.
Tagliabue, C. J., Mfg. Co., 18 33rd St., Brooklyn, N. Y.
Taylor Instrument Co., Rochester, N. Y.

GAUGES, "U"
Fort Worth Laboratories, 828½ Monroe St., Ft. Worth, Texas

GAUGES, Water
Bailey Meter Co., 2009 E. 46th St., Cleveland, Ohio
Buckeye Iron & Brass Works, 310 E. Third St., Dayton, Ohio
The Brown Instrument Co., Philadelphia, Pa.
F. A. Burrows Mfg. Co., York, Pa.
Davis Instrument Mfg. Co., Ind., 110 W. Fayette St., Baltimore, Md.
Defender Automatic Regulator Co., St. Louis, Mo.
Detroit Lubricator Co., 5938 Trumbull Ave., Detroit, Mich.
Jenkins Bros., 80 White St., New York, N. Y.
Northern Tool Co. Inc., 806 Union St., Utica, N. Y.
Powell, Wm. Co., Cincinnati, O.
Sargent Co., 625 W. Jackson Blvd., Chicago, Ill.
Williams Gauge Co., 543 Fourth Ave., Pittsburgh, Pa.

GAUGE GLASSES
Rogers Co., H. A., 87 Walker St., New York, N. Y.
Sargent Co., 625 W. Jackson Blvd., Chicago, Ill.
The Strong Machinery & Supply Co., 21 Walker St., New York, N. Y.

GAS, Oxygen and Hydrogen
Magnolia Gas Products Co., Houston, Texas

GEARS
Bethlehem Steel Co., Bethlehem, Pa.
Chain Belt Co., Milwaukee, Wis.
The Earle Gear & Machine Co., 4707-15 Stenton Ave., Philadelphia, Pa.
The Falk Corp., Milwaukee, Wis.
Foote Bros. Gear & Machine Co., 215 N. Curtis St., Chicago, Ill.
The Hill Clutch Machine & Foundry Co., Cleveland, Ohio
Jones, W. A., Foundry & Machine Co., 4415 W. Roosevelt Road, Chicago, Ill.
Morse Chain Co., Ithaca, N. Y.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

GEARS, Reduction
De Laval Steam Turbine Co., Trenton, N. J. See page 58.
Elliott Co., Jeannette, Pa.
Paine, H. A., Houston, Texas
The Terry Steam Turbine Co., Hartford, Conn.

GENERATORS
Cook Motor Co., Delaware, Ohio
De Laval Steam Turbine Co., Trenton, N. J. See page 58.
General Electric Co., Schenectady, N. Y.
The Griscom-Russell Co., 94 West St., New York City. See page 9.
Houston Armature Works, Houston, Texas
The Ideal Electric & Mfg. Co., Mansfield, Ohio
The Pyle-National Co., Chicago, Ill.
Standard Turbine Corp., Scio, New York
Wesche, B. A. Electric Co., 1628 Vine St., Cincinnati, Ohio
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Rochester Electric Products Corp, Rochester, N. Y.
Engberg's Electric & Mechanical Works, St. Joseph, Mich.

GENERATING SETS, Electric
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Kerr Turbine Co., Wellsville, New York

GENERATORS, Turbo
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
De Laval Steam Turbine Co., Trenton, N. J.
Houston Armature Works, Inc., Houston, Texas
Kerr Turbine Co., Wellsville, New York
Moore Steam Turbine Corp., Wellsville, N. Y.
The Pyle-National Co., Chicago, Illinois
The Terry Steam Turbine Co., Hartford, Conn.

GENERATORS, Ammonia Gas
Bousman Mfg. Co. Inc., 1157-59 Plainfield Ave. N. E. Grand Rapids, Mich.

GENERATORS, Welding
Air Reduction Sales Co., 342 Madison Ave., New York City, N. Y.
Carbic Mfg. Co., Duluth, Minn.
International Oxygen Co., 796 Frelinghuysen Ave., Newark, N. J.
Economy Welding Co., 5-9 W. 20th St., Kansas City, Mo.
Oxweld Acetylene Co., Thompson Ave., and Orton St., Long Island City, N. Y.

GOGGLES
American Optical Co., 813-815 Kress Bldg., Houston, Texas
Pulmosan Safety Equipment Co., 45 Willoughby St., Brooklyn, N. Y. See page 83.

GOVERNORS
Cash, A. W., Co., P. O. Box 35, Decatur, Ill.
Fisher Governor Co., Marshalltown, Iowa
Foster Engineering Co., 109-117 Monroe St., Newark, N. J.
Gardner Governor Co., 100 Williamson, Quincy, Illinois
Klipfel Mfg. Co., Chicago, Ill.
The Pickering Governor Co., Portland, Conn.
The P. H. & F. M. Roots Co., Chicago, Ill.
Waters Governor Co., 141 Milk St., Boston, Mass.
Witt, G. E., Co., 862-64 Howard St., San Francisco, Cal.

GOVERNORS, Boiler Feed
Kitts Mfg. Co., 19 W. Seneca St., Oswego, N. Y.

GOVERNORS, Gas
The Chaplin-Fulton Mfg. Co., 28-34 Penn Ave., Pittsburgh, Pa.
Equitable Meter Co., Pittsburgh, Pa.

GOVERNORS, Pump
The Chaplin-Fulton Mfg. Co., 28-34 Penn Ave., Pittsburgh, Pa.
Fisher Governor Co., ("Fisher") Marshalltown, Iowa
Gardner Governor Co., Quincy, Ill.
Jarecki Mfg. Co., Erie, Pa.
McDonough Coal Saving Corp., Detroit, Mich.
Northern Equipment Co., Erie, Pa.
The Plouff Corp., Boston, Mass.
Strong, Carlisle & Hammond Co., 326 Frankfort St., Cleveland, O.
The C. E. Squires Co., E. 40th St. and Kelley Ave., Cleveland, Ohio
Walworth Mfg. Co., 142 High St., Boston, Mass.
Watts Regulator Co., 250-252 Lowell St., Lawrence, Mass.
Wilgus Manufacturing Co., 1722 E. 16th St., Los Angeles, Calif.
The Williams Gauge Co., Pittsburgh, Pa.

GRATES
Barnhart-Davis Co., Warren, Pa.
Marion Machine, Foundry & Supply Co., Marion, Ind.
James McMillam & Co., 114 Clarkson St., Chicago, Ill.
Murray Iron Works Co., Burlington, Iowa
John O'Brien Boiler Works Co., 11th to 13th Mullanphy to Howard St., St. Louis, Mo.
St. John Grate Bar Co., 66-68-70 Chancery Lane, Philadelphia, Pa.

GRATINGS, Floor
Clow, James B., & Sons, 534 So. Franklin St., Chicago, Ill.
Irving Iron Works Co., Long Island City, N. Y.
Kerlow Steel Flooring Co., 218 Culver Ave., Jersey City, N. J.

GRINDERS
Rochester Electric Products Co., Rochester, N. Y.
Stockbridge Machine Co., 68 Abbott St., Worcester, Mass.

GRINDERS, Chaser
Landis Machine Co., Waynesboro, Penn.

HACKSAWS
The L. S. Starrett Co., Athol, Mass.

HAIR-FELT
Rogers Asbestos Co., Houston, Texas

HAMMERS
Sculley Steel & Iron Co., Chicago, Ill.

HAMMERS, Pneumantic
Barr, H. Edsil, Engineers, Erie, Pa.
Chicago Pneumatic Tool Co., 6 E. 44th St., Chicago, Ill.
Cleveland Pneumatic Tool Co., 3734 E. 78th St., Cleveland, O.
Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, New York, N. Y.
Ryerson, Joseph T., & Sons, 16th and Rockwell Sts., Chicago, Ill.
The Champion Blower & Forge Co., Lancaster, Pa.
Beaudry Co., Parkway at Vine St., Everett, Mass.

HANGERS, Shaft
The Berger Mfg. Co., Canton, O.
Dodge Manufacturing Corp., Mishawaka, Ind.
Jones, W. A., Foundry & Machine Co., 4415 W. Roosevelt Road, Chicago, Illinois
Medart Co., St. Louis, Mo.

HARDWARE
Briggs Weaver Machinery Co., Dallas, Texas
Lawrence Brothers, Sterling, Ill.
Shapleigh Hardware, St. Louis, Mo.

HEADS, Condenser
Barnhart-Davis Co., Warren, Pa.

HEADS, Exhaust
Hoppes Mfg. Co., 19 Larch St., Springfield, Ohio

HEADERS
Barnhart-Davis Co., Warren, Pa.

HEADERS, Welded
The Shaw-Kendall Engineering Co., 120-130 S. Superior St., Toledo, Ohio

HEATERS
American Blower Co., Detroit, Mich.
C. F. Braun & Co., Alhambra, Cal. See pages 52-53.
Elliott Co., Jeannette, Pa.
Howard Iron Works and Alberger Heater Co., 281-289 Chicago St., Buffalo, N. Y.
Southwestern Engineering Corp., 1221 Hollingsworth Bldg., Los Angeles, Calif.

HEATERS, Air
The Green Fuel Economizer Co., Beacon, N. Y.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

HEATERS, Electric
Central Scientific Co., 460 E. Ohio St., Chicago, Ill.

HEATERS, Feed Water
Griscom Russell Co., 90 West St., New York, N. Y. See page 9.
The Whitlock Coil Pipe Co., Hartford, Conn.

HEATERS, Feed Water Closed
Alberger Heater Co., 281 Chicago St., Buffalo, N. Y.
Alberger Pump & Condenser Co., 140 Cedar St., New York, N. Y.
Biggs Boiler Works Co., Case Ave. and Newton St., Akron, Ohio.
Brownell Co., Dayton, Ohio
Brunswick-Kroeschell Co., Jersey Ave., New Brunswick, N. J.
Casey-Hedges Co., Chattanooga, Tenn.
Graver Corp., 414 Todd Ave., East Chicago, Ind. See pages 3-33.
Powers Regulator Co., 2776 Greenview Ave., Chicago, Ill.
Ross Heater & Mfg. Co., 1407-11 West Ave., Buffalo, N. Y.
Walsh & Weidner Boiler Co., Chattanooga, Tenn.
Worthington Pump Machinery Corp., 115 Broadway, New York, N. Y.

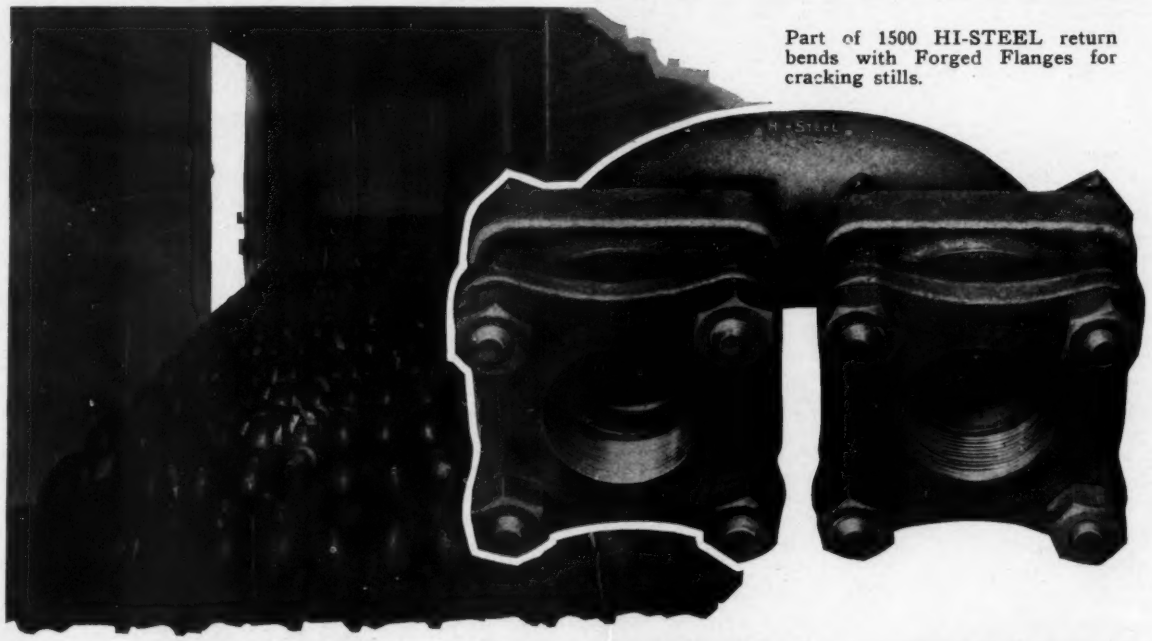
HEATERS, Feed Water Open
Brownell Co., Dayton, Ohio
Griscom Russell Co., 90 West St., New York, N. Y. See page 9.
Walsh & Weidner Boiler Co., Chattanooga, Tenn.

HEATERS, Fuel Oil
Casey-Hedges Co., Chattanooga, Tenn.
The Coen Co. Inc., 112 Market St., San Francisco, Calif.
The Griscom-Russell Co., Monadnock Bldg., Chicago, Ill. See page 9.
Lockett, A. M. & Co., 521 Baronne St., New Orleans, La.
The Maxon Premix Burner Co., Belt Ry. & S. Mulberry St., Muncie, Ind.
Ross Heater & Mfg. Co. (Inc.,) 1407-11 West Ave., Buffalo, N.Y.
Schutte & Koerting Co., Philadelphia, Pa. See page 39.
The Whitlock Coil Pipe Co., Hartford, Conn.
Witt, G. E., Co., 862-64 Howard St., San Francisco, Calif.

HEATERS, Water Supply
Central Automatic Sprinkler Co., 5145-47 Delancey St., Philadelphia, Pa.
Hoppes Mfg. Co., 19 Larch St., Springfield, Ohio
Kewanee Boiler Co., Kewanee, Ill.
Manning, Maxwell & Moore, Inc., 100 E. 42nd St., New York City
Paine, H. A., Houston, Texas
Power Plant Specialty Co., 440 S. Dearborn St., Chicago, Ill.
Walworth Mfg. Co., 142 High St., Boston, Mass.

HEATING, Apparatus
American Blower Co., 6004 Russell Detroit, Mich.
International Heater Co., Utica, New York
Lewis Manufacturing & Supply Co., 428 S. 5th St., Louisville, Ky.
Simpson & Adamson, Michigan City, Ind.

HEATING, Systems
Gorton & Lidgerwood Co., 96 Liberty St., New York City



Part of 1500 HI-STEEL return bends with Forged Flanges for cracking stills.

HI-STEEL RETURN BENDS

for pressure stills

"OHIO" Products

Electric Steel Castings
Hi-Steel Fittings
Open Hearth Steel Castings
Fahrite Heat-resisting Alloy Castings
Tank Car Bolsters, Side Frames and Repair Castings.

The return bends illustrated above show the confidence placed by one of the largest refineries in Hi-Steel fittings. This confidence is the result of a reputation for no failures at elevated pressures and temperatures.

Hi-Steel fittings are clean, solid castings of electric steel annealed, machined and tested.

They are made in standard types and sizes or to special drawings for any working conditions.

Send us your inquiries.

The Ohio Steel Foundry Co.

SALES OFFICES:
Kansas City—700 Baltimore Ave.
Houston—Harrisburg Pipe & Pipe Bending Co., of Texas
Chicago—Peoples Gas Bldg.
New York—50 Church St.
Philadelphia—22 So. 15th St.
Los Angeles—731 Merchants Nat. Bank Bldg.

SPRINGFIELD, OHIO

Plants in
Springfield,
Bucyrus,
Lima.

The Harrisburg Pipe & Pipe Bending Co. of Texas, Inc.

Houston, Texas.
Distributors for Texas.

HOISTS
Chicago Pneumatic Tool Co., 6 E. 44th St., New York City
Harnishfeger Corp., Milwaukee, Wis.
Paine, H. A., Houston, Texas
Sculley Steel & Iron Co., Chicago, Ill.
Shepard Electric Crane & Hoist Co., Montour Falls, N. Y.
Sullivan Machinery Co., 122 S. Michigan Ave., Chicago, Ill.

HOLDERS, Electrode
Wilson Welder & Metals Co., Wilson Bldg., Hoboken, N. J.

HOODS, Acid
Pulmosan Safety Equipment Co., 45 Willoughby St., Brooklyn, New York. See page 83.

HOOKS, Belt
Jewell Belting Co., Hartford, Conn.
J. S. Turner Mfg. Co., 133 Middle St., Lowell, Mass.

HOSE
American Hose Co., Waterbury, Conn.
U. S. Flexible Metallic Pipe Co., Houston, Texas

HOSE, Fire
The Republic Rubber Co., Youngstown, Ohio

HOPPERS, Storage
The Brady Conveyors Corp., 20 W. Jaskson Blvd., Chicago, Ill.

HOUSES, Portable
Crain Ready-Cut House Co., Houston, Texas. See page 63.

HYDRANTS, Fire
Darling Valve & Mfg. Co., Williamsport, Pa.
Kennedy Valve Mfg. Co., Elmira, N. Y.
The Ludlow Valve Mfg. Co., Troy, N. Y.
Vogt Brothers Mfg. Co., 1402 W. Main St., Louisville, Ky.

HYDROMETERS
James Berg Mfg. Co., 3707 12th Ave., Brooklyn, N. Y.
Central Scientific Co., 460 E. Ohio St., Chicago, Ill.
Eimer & Amend, Third Ave., 18 to 19 St., New York City.
The Emil Greiner Co., 55 Fulton St., New York City
Fort Worth Laboratories, 828½ Monroe St., Ft. Worth, Texas.
The Foxboro Co. Inc., Foxboro, Mass.
The Jos. W. Hays Corp., Michigan City, Ind.
Taylor Instrument Co., Rochester, New York. See page 90.
Wagner, Carl H., 1944 N. Albany Ave., Chicago, Ill.

HYGRODEIKS
Taylor Instrument Cos., Rochester, N. Y. See page 90.

HYGROMETERS
Henry J. Green, 1101 Bedford Ave., Brooklyn, New York
Queen-Gray Co., 64-70 W. Johnson St., Philadelphia, Pa.
Tagliabue, C. J. Mfg. Co., 18-88 33rd St., Brooklyn, N. Y.
Taylor Instrument Co., Rochester, N. Y. See page 90.

IDLERS, Belt
Hill Clutch, Machine & Foundry Co., Foot of 65th St., Cleveland, Ohio
Perry, Harry M., 702 N. Main St., Los Angeles, Calif.
Western Machinery Co., 900 North Main St., Los Angeles, Calif. See page 7.

IGNITION
Wyco Electric Co., Springfield, Mass.

INDICATORS, Combustion
Uehling Instrument Co., 473 Getty Ave., Patterson, N. J.

INDICATORS, Engine
American Schaeffer & Budenberg Corp., Berry & 5th Sts., Brooklyn, N. Y. See page 64.
Manning, Maxwell & Moore, Inc., 100 E. 42nd St., New York City
James L. Robertson & Sons, 78-80 Murray St., New York City
Taylor Instrument Co., Rochester, N. Y. See page 90.
Trill Indicator Co., Corry, Pa.

INDICATORS, Temperature
Leeds & Northrup Co., Philadelphia, Pa.

INJECTORS
Manning, Maxwell & Moore, Inc., 100 E. 42nd St., New Pork City
Schutte & Koerting Co., Philadelphia, Pa. See page 39.
Witt, G. E., Co, 862-64 Howard St., San Francisco, Calif.

INSTRUMENTS, Drawing
The C. F. Pease Co., 813-821 N. Franklin St., Chicago, Ill.

INSTRUMENTS, Electrical
Brown Instrument Co., Wayne & Windrim Ave., Philadelphia, Pa. See page 82.
Central Scientific Co., 460 E. Ohio St., Chicago, Ill.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

INSTRUMENTS, Engineering
Eugene Dietzgen Co., 166 W. Monroe St., Chicago, Ill.
W. & L. E. Gurley, Troy, N. Y.

INSTRUMENTS, Humidity
Fort Worth Laboratories, 828½ Monroe St., Fort Worth, Texas. See page 84.

INSTRUMENTS, Measuring
Central Scientific Co., 460 E. Ohio St., Chicago, Ill.

INSTRUMENTS, Oil Testing
The Denver Fire Clay Co., P. O. Box 1107, Denver, Colo.

INSTRUMENTS, Recording
American Schaeffer & Budenberg Co., Brooklyn, N. Y. See page 64.
Bailey Meter Co., 2009 E. 46th St., Cleveland, Ohio
Bristol Co., Waterbury, Conn.
Brown Instrument Co., Wayne & Windrim Ave., Philadelphia, Pa.
Builders Iron Foundry, Providence, R. I.
Foxboro Co., Foxboro, Mass.
Maintenance Engineering Corp., 614 Second Natl Bank Bldg., Houston, Texas. See page 95.
Queen-Gray Co., 64-70 W. Johnson St., Philadelphia, Pa.
Republic Flow Meters Co., 2236 Diversey Parkway, Chicago, Ill.
Standard Thermometer Co., Boston, Mass.
Tagliabue, C. J., Mfg. Co., 18-88 33rd St., Brooklyn, N. Y. See page 56.
Taylor Instrument Co., Rochester, N. Y. See page 90.
Thwing Instrument Co., 3339 Lancaster Ave., Philadelphia, Pa.
Wilson-Maeulen Co., 383 Concord Ave., New York, N. Y.
Yarnall-Waring Co., 7603-20 Queen St., Chestnut Hill, Philadelphia, Pa.

INSTRUMENTS, Scientific
Brown Instrument Co., Wayne & Windrim Ave., Philadelphia, Pa. See page 82
Central Scientific Co., 460 E. Ohio St., Chicago, Ill.
Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia, Pa.
Taylor Instrument Co., Rochester, N. Y. See page 90.
Williams, Brown & Earle, Inc., 918 Chestnut St., Philadelphia, Pa. See page 88.

INSTRUMENTS Surveying
A. S. Aloe Co., 513 Olive St., St. Louis, Mo.
The H. Cole Co., 24 N. High St., Columbus, Ohio
B. L. Makepeace, Inc., 387 Washington St., Boston, Mass.

INSTRUMENTS, Testing
Central Scientific Co., 460 E. Ohio St, Chicago, Ill.
Taylor Instrument Co., Rochester N. Y. See page 90.

INSULATING BLOCKS
Celite Products Co., Van Nuys Bldg., Los Angeles, Calif. See front cover.

INSULATING BRICK
Celite Products Co., Van Nuys Bldg., Los Angeles, Calif. See front cover.

INSULATING MATERIAL, Asbestos
Norristown Magnesia and Asbestos Co., Norristown, Pa.
Johns-Manville, Inc., Madison Ave. at 41st St., New York City

INSULATION, Boiler
R. V. Aycock Co., 1526 Grand Ave., Kansas City, Mo.
Johns-Manville, Inc., Madison Ave. at 41st St., New York City

INSULATING CEMENTS
Celite Products Co., Van Nuys Bldg., Los Angeles, Calif. See front cover.
Quigley Furnace Specialty Co., 26 Cortlandt St., New York City See page 90.

INSULATING MATERIAL
Insulating Products Co., Kalamazoo, Mich.
Quigley Furnace Specialties Co., 26 Cortlandt St., New York City See page 90.
Witt, G. E., Co., 862-64 Howard St., San Francisco, Calif.
Westinghouse Electric & Mfg. Co. East Pittsburgh, Pa.

INSULATING MATERIALS, Cold
R. V. Aycock Co., 1526 Grand Ave., Kansas City, Mo.
Banner Rock Products Co., Alexandria, Ind.
Barber Asphalt Co., Land Title Bldg., Philadelphia, Pa.
Insulating Products Co., 1601 Fulford St., Kalamazoo, Michingan
Johns-Manville, Inc., 292 Madisor Ave., New York, N. Y.
Keasbey & Mattison Co., Ambler, Pa.

INSULATING MATERIALS, Heat
Armstrong Cork & Insulation Co., 122 24th St., Pittsburgh, Pa.
Banner Rock Products Co., Alexandria, Ind.
Celite Products Co., Van Nuys Bldg., Los Angeles, Calif. See front cover.
Ehret Magnesia Mfg. Co., Valley Forge, Pa.
Insulating Products Co., 1601 Fulford St., Kalamazoo, Mich.
Johns-Manville, Inc., 292 Madison Ave., New York, N. Y.
Keasbey & Mattison Co., Ambler, Pa.
The Phillip Carey Co., Lockland, Ohio
Standard Asbestos Mfg. Co., 820-822 W. Lake St., Chicago, Ill.
Quigley Furnace Specialty Co., 26 Cortlandt St., New York, N. Y. See page 90.

INTERCHANGERS, Heat
Alberger Heater Co., 281-289 Chicago St., Buffalo, N. Y.

INTERCOOLERS
Southwestern Engineering Corp., 1221 Hollingsworth Bldg., Los Angeles, Calif. See page 49.

IRON, Bar
Bethlehem Steel Co., Bethlehem, Pa.

IRON, Corrugated
The Berger Mfg. Co., Canton, O.

IRONS, Stay Bolt
Harrisburg Pipe & Pipe Bending Co. of Texas, Houston, Texas

JACKS, Hydraulic
Richard Dudgeon, Inc., 24-26 Columbia St., New York City

JARS, Hydrometer
The James Berg Mfg. Co., 3707 12th Ave., Brooklyn, N. Y.

JOINTS Expansion
C. F. Braun & Co., Alhambra, Cal. See pages 52-53.
Farnsworth Co., Norristown, Pa.
Alberger Heater Co., 281-289 Chicago St., Buffalo, N. Y.
Wheeler Condenser & Engineering Co., 149 Broadway, New York, N. Y. See page 55.

JOINTS, Flexible Ball
Foster Engineering Co., 109-117 Monroe St., Newark, N. J.

JOINTS, Swing
Barco Mfg. Co., 1801 Winnemac Ave., Chicago, Ill.
Farnsworth Co., Norristown, Pa.
Jarecki Mfg. Co., Erie, Pa.
McDonald, A. Y. Mfg. Co., Dubuque, Iowa
Morrison Brothers, Dubuque, Iowa

KETTLES, Steam Jacketed
Casey-Hedges Co., Chattanooga, Tenn.
Graver Corp., 414 Todd Ave., East Chicago, Ind. See pages 3-33.
Murray Iron Works Co., Burlington, Iowa
Walsh & Weidner Boiler Co., Chattanooga, Tenn.

LABORATORY, Apparatus
The Denver Fire Clay Co., P. O. Box 1107, Denver, Colo.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

LABORATORY, Supplies
Eimer & Amend, 205 Third Ave., New York, N. Y.
Fort Worth Laboratories, Fort Worth, Texas. See page 84.
Kansas City Testing Lab., Kansas City, Kansas
The Refinery Supply Co., 4th and Detroit Sts., Tulsa, Okla. See page 86.
Westcott & Greis, Dallas, Texas
Wilson-Maeulen, New York, N. Y.

LATHES
The American Tool Works Co., Cincinnati, Ohio
Axelson Machine Co., P. O. Box 316, Los Angeles, Calif.
Reed-Prentice Co., Worecester, Mass.
The Willard Machine Tool Co., Cincinnati, Ohio

LEAD, Solder and Sheet
Hoyt Metal Co., Boatman's Bank Bldg., St. Louis, Mo.
National Lead Co., 111 Broadway New York City

LEATHER, Hydraulic
Bonner & Barnewall, 440 Lafayette St., New York City

LEATHER, Lace
Bonner & Barnewall, 440 Lafayette St., New York City
The Graton & Knight Mfg. Co., 356 Franklin St., Worcester, Mass.
Jewell Belting Co., Hartford, Conn.
Edward R. Ladew Co. Inc., 29 Murray St., New York City
McLanathan & Son, F. W., Lawrence, Mass.
Witt, G. E., Co., 862-64 Howard St., San Francisco, Calif.

LEATHER, Pump
Bonner & Barnewall, 440 Lafayette St., New York City

LIGHTING, Equipment
The Alexander Milburn Co., 1416-1428 W. Baltimore St., Baltimore, Md.
Universal Motor Co., Oshkosh, Wis.
Western Electric Co. Inc., Austin and Wood Sts., Dallas, Texas
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

LIGHTS, Flood
General Electric Co., Schenectady, New York
The Pyle-National Co., Chicago, Ill.

LIGHTS, Portable
Carbic Mfg. Co., Duluth, Minn.

LINERS, Pump
William Wharton Jr., & Co. Inc., Easton, Pa.

LININGS, Furnace
Celite Products Co., 53 W. Jackson Blvd., Chicago, Ill. See front cover.

Welcome, Ass'n of Natural Gasoline Manufacturers!

April 22nd and 23rd are red-letter days in the calendar of the Association of Natural Gasoline Manufacturers. From every indication this next convention, in Tulsa, is destined to surpass all previous accomplishments and attendance records.

We extend a hearty invitation to call and inspect our new home while in Tulsa. Our offices are now incorporated with our warehouse at 125 WEST FIRST STREET, where our facilities for serving you have been increased to keep pace with the growing demand for our products.

DON'T FAIL TO VISIT US

DISTRIBUTORS:

Pacific Coast Fields:
SMITH, BOOTH USHER COMPANY,
228 S. Central Ave., Los Angeles
50 Fremont St., San Francisco

Mid-Continent:
GAS ENGINEERING AND CONSTRUCTION COMPANY,
Tulsa, Okla., 125 W. First St.

WM. G. (BILL) CUMMINGS
President of Gas Engineering and Construction Company, Mid-Continent and Wyoming distributors for CLARK BROS. COMPANY

Eureka Fire Brick Works, Pittsburgh, Pa.
Jointless Fire Brick Co., 1130 Clay St., Chicago, Ill.
Waite & Davey Co. Inc., 5 Court Square, Long Island City, New York
Walsh Fire Clay Products Co., 4070 No. Main St., St. Louis, Mo.

LOCKERS
The Berger Mfg. Co., Canton, O.
Edward J. Darby & Sons, Inc., 317 Vine St., Philadelphia, Pa.
Lyon Metallic Mfg. Co., Aurora, Ill.
Medart Mfg. Co., Fred, St. Louis, Mo.
Terrell's Equipment Co., Grand Rapids, Mich.

LUBRICATORS
American Injector Co., Detroit, Mich.
Detroit Lubricator Co., Trumbull, Lincoln, Marquette and Viaduct, Detroit, Mich.
Kelley & Jones Co., Greenburg, Pa.
The Lunkenheimer Co., Cincinnati, Ohio. See page 14.
Manzel Bros., Buffalo, N. Y.
Ohio Injector Co., So. Main St., Wadsworth, Ohio
Powell, Wm., Co., 2525 Spring Grove Ave., Cincinnati, Ohio
Williams, D. T., Valve Co., Spring Grove Ave., and Township St., Cincinnati, Ohio

LUBRICATORS, Force Feed
Detroit Lubricator Co., 5938 Trumbull Ave., Detroit, Mich.
Greene, Tweed & Co., 109 Duane St., New York, N. Y.
Hills-McCanna Co., 2025 Elston Ave., Chicago, Ill. See page 8.
Manzel Brothers Co., 309 to 319 Babcock St., Buffalo, N. Y.
McCord Radiator & Mfg. Co., Detroit, Mich.
McCullough Mfg. Co., 2632-34 Central Ave., Minneapolis, Minn.
Powell, Wm., Co., Cincinnati, O.

LUBRICATORS, Graphite
Detroit Lubricator Co., 5938 Trumbull Ave., Detroit, Mich.

LUBRICATORS, Sight Feed
Greene, Tweed & Co., 109 Duane St., New York, N. Y.
Jarecki Mfg. Co., Erie, Pa.
Kelly & Jones Co., Greensburg, Pa.
Witt, G. E., Co., 862-64 Howard St., San Francisco, Calif.

MANIFOLDS
Barnhart-Davis Co., Warren, Pa.
Joseph Reid Gas Engine Co., Oil City, Pa.

BANOMETERS
American Blower Co., Detroit, Mich.
Fort Worth Laboratories, 828½ Monroe St., Fort Worth, Texas. See page 84.
The Refinery Supply Co., Fourth and Detroit Sts., Tulsa, Okla. See page 86.

MASKS, Hose
Mine Safety Appliances Co., 908-12 Chamber of Commerce Bldg., Pittsburgh, Pa. See page 85.
Pulmosan Safety Equipment Co., 45 Willoughby St., Brooklyn, N. Y. See page 83.

MASKS, Gas
Pulmosan Safety Equipment Co., 45 Willoughby St., Brooklyn, N. Y. See page 83.

MERCURY
Fort Worth Laboratories, 828½ Monroe St., Fort Worth, Texas See page 84.

METERS, Air
A. S. Aloe Co., 513 Olive St., St. Louis, Mo.
The Connersville Blower Co., Connersville, Ind.
National Meter Co., 299 Broadway, New York, N. Y. See page 86.

METERS, Differential Flow
Fort Worth Laboratories, 828½ Monroe St., Fort Worth, Texas See page 84.

METERS, Electrical
The Brown Instrument Co., Philadelphia, Pa. See page 82.

METERS, Flow
General Electric Co., Schnectady, New York
National Meter Co., 299 Broadway, New York, N. Y. See page 86.

METERS, Gasoline
Buffalo Meter Co., 2917 Main St., Buffalo, N. Y.
Builders Iron Foundry, Providence, R. I.
National Meter Co., 299 Broadway, New York, N. Y. See page 86.
Neptune Meter Co., 50 E. 42nd St., New York City

METERS, Gas
Equitable Meter Co., 422-434-444 First Ave., Pittsburgh, Pa.
The P. H. & F. M. Roots Co., Chicago, Ill. See inside front cover.
National Meter Co., 299 Broadway, New York City. See page 86.

METERS, Oil
Associated Supply Co., Los Angeles, Calif.
Buffalo Meter Co., 2917 Main St. Buffalo, New York
Builders Iron Foundry, Providence, R. I.
National Meter Co., 299 Broadway, New York, N. Y. See page 86.
Neptune Meter Co., 50 E. 42nd St., New York City.
Witt, G. E., Co., 862-64 Howard St., San Francisco, Calif.

METERS, Water
Buffalo Meter Co., 2917 Main St Buffalo, N. Y.
Hoppes Mfg. Co., 19 Larch St., Springfield, Ohio
National Meter Co., 299 Broadway, New York, N. Y. See page 86.
Neptune Meter Co., 50 E. 42nd St., New York City
Paine, H. A., Houston, Texas

METERS, Steam and Water
National Meter Co., 299 Broadway New York, N. Y. See page 86.
Paine, H. A., Houston, Texas

METERS, Wide-Range
The Foxboro Co., Inc., Foxboro Mass.

MICROSCOPE
Bosch & Lamb Optical Co., Rochester, N. Y.
The Denver Fire Clay Co., P. O Box 1107, Denver, Colo.

MILLBOARD, Asbestos
Rogers Asbestos Co., Houston Texas

MOTORS
Engberg's Electric & Mechanical Works, St. Joseph, Mich.
Fairbanks, Morse & Co., 900 So Wabash Ave, Chicago, Ill.
General Electric Co., Schnectady New York
Wm. T. Johnston Co., Cincinnati Ohio
The Ideal Electric & Mfg. Co., Mansfield, Ohio
The Master Electric Co., Dayton Ohio
Robbins & Myers Co., Springfield Ohio
Rochester Electric Products Corp., Rochester, N. Y.
Sturtevant Company, B. F., Hyde Park, Boston, Mass.
Wagner Electric Co., St. Louis Mo.
Wesche, B. A., Electric Co., 1628 Vine St., Cincinnati, Ohio
Western Electric Co., Austin and Wood Sts., Dallas, Texas.
Westinghouse Electric & Mfg. Co East Pittsburgh, Pa.

MOTORS, Induction
Century Electric Co., 1827 Pine St., St. Louis, Mo.

MOTORS, Single Phase
Century Electric Co., 1827 Pine St., St. Louis, Mo.

MOTORS, Split Phase
Century Electric Co., 1827 Pine St St. Louis, Mo.

MOTORS, Synchronous
Electric Machinery Mfg. Co., 14th and Tyler Sts., N. E., Minneapolis, Minn.

PACKING, Ammonia
Garlock Packing Co., Palmyra N. Y. See page 57.
Goetze Gasket & Packing Co., New Brunswick, N. J. See page 98.
B. F. Goodrich Rubber Co., Akron Ohio
Hewett Rubber Co., Buffalo, N. Y
Jenkins Bros., 80 White St., New York, N. Y.
Johns-Manville, Inc., 292 Madison Ave., New York, N. Y.
Quaker City Rubber Co., Philadelphia, Pa.
United States Rubber Co., 1790 Broadway, New York, N. Y.
Anchor Packing Co., Philadelphia, Pa.
R. V. Aycock Co., 1526 Grand Ave., Kansas City, Mo.
The Diamond Rubber Co., Akron Ohio
Garlock Packing Co., Palmyra N. Y.
General Asbestos & Rubber Co. Charleston, S. C.
Goodyear Tire & Rubber Co., Akron, Ohio
Greene, Tweed & Co., 109 Duane St., New York, N. Y.
Hewett Rubber Co., Buffalo, N. Y
Imperial Belting Co., 400 N. Lincoln St., Chicago. Ill.
Jenkins Bros., 80 White St., New York, N. Y.
Johns-Manville, Inc., Madison Ave. at 41st St., New York City
Quaker City Rubber Co., Philadelphia, Pa.
U. S. Indestuctible Gasket Co. 829 E. 15th St., Brooklyn, N. Y.
United States Rubber Co., 1790 Broadway, New York, N. Y.

PACKING, Cork
The Booth Felt Co., Inc., 463-473 19th St., Brooklyn, N. Y.
Witherup Cork Packing Co., Beaumont, Texas

PACKING, Felt
The Booth Felt Co., Inc., 463-473 19th St., Brooklyn, N. Y.

PACKING, Fibrous
Eureka Packing Co., 78-80 Murray St., New York City, N. Y.

PACKING, Flax
Garlock Packing Co., Palmyra. New York. See page 57.
Hewett Rubber Co., Buffalo, N. Y.

PACKING, Gasoline
Garlock Packing Co., Palmyra, New York. See page 37.
Goetze Gasket & Packing Co., New Brunswick, N. J. See page 98.

PACKING, High Pressure
The Republic Rubber Co., Youngstown, Ohio

PACKING, Hydraulic
Crane Packing Co., 1800 Cuyler Ave., Chicago, Ill. See page 93.
Diamond Rubber Co., Akron, Ohio
Garlock Packing Co., Palmyra, New York. See page 51.
Goetze Gasket & Packing Co., New Brunswick, N. J. See page 98.
B. F. Goodrich Rubber Co., Akron, Ohio
Greene, Tweed & Co., 109 Duane St., New York, N. Y.
Hewett Rubber Co., Buffalo, N. Y.
Hydraulic Press Mfg. Co., Mt. Giliad, Ohio
Johns-Manville, Inc., 292 Madison Ave., New York, N. Y.
Manhattan Rubber Co., Passiac, N. J.
Quaker City Rubber Co., Philadelphia. Pa.
Republic Rubber Co., Youngstown, Ohio

PACKING, Leather
The Graton & Knight Mfg. Co., 356 Franklin St., Worcester, Mass.
Judd & Leland Mfg. Co., Clifton Springs, N. Y.

PACKING, Metallic
The Collins Metallic Packing Co., Philadelphia, Pa.
Crane Packing Co., 1800 Cuyler Ave., Chicago, Ill. See page 93.
Eureka Packing Co., 78-80 Murray St., New York City, N. Y.
Garlock Packing Co., Palmyra, N. Y. See page 57.
Goetze Gasket & Packing Co., New Brunswick, N. J. See page 57.
Metallo Gasket Co., 242 Lafayette St., New York City. See page 55.

PACKING, Oil
Garlock Packing Co., Palmyra, N. Y. See page 57.
Goetze Gasket & Packing Co., New Brunswick, N J. See page 98.
B. F. Goodrich Rubber Co., Akron, Ohio
New York Belting & Packing Co., 91 Chambers St., New York, N. Y.
Quaker City Rubber Co., Wissinoming, Philadelphia, Pa.
U. S. Indestructible Gasket Co., 829 E. 15th St., Brooklyn, N. Y.
The Diamond Rubber Co., Akron, Ohio
United States Rubber Co., 1790 Broadway, New York, N. Y.

PACKING, Palmetto
Witt, G. E., Co., 862-64 Howard St., San Francisco, Calif.

PACKING, Paper
The Booth Felt Co. Inc., 463-473 19th St., Brooklyn, N. Y.

PACKING, Rawhide
Mabbs Hydraulic Packing Co., 431 S. Dearborn St., Chicago, Ill.

PACKING, Piston
Edison Packing & Sales Co., 234 State St., Boston, Mass.
Garlock Packing Co., Palmyra, N. Y. See page 57.

PACKING, Rubber
The Diamond Rubber Co., Akron, Ohio
Garlock Packing Co., Palmyra, N. Y. See page 57.
Voorhees Rubber Mfg. Co., 20 to 56 Bostwick Ave., Jersey City, N. J.

PACKING, Sheet
Edison Packing & Sales Co., 234 State St., Boston, Mass.
Eureka Packing Co., 78-80 Murray St., New York City, N. Y.
Garlock Packing Co., Palmyra, N. Y. See page 57.
Goetze Gasket & Packing Co., New Brunswick, N. J. See page 98.
Goodyear Tire & Rubber Co., Akron, Ohio
Hewett Rubber Co., Buffalo, N. Y.
Imperial Belting Co., 400 N. Lincoln, Chicago, Ill.
Jenkins Bros., 80 White St., New York, N. Y.
Johns-Manville, Inc, 292 Madison Ave., New York, N. Y.
Manhattan Rubber Mfg. Co., Passaic, N. J.
New York Belting & Packing Co., 91 Chambers St., New York, N. Y.
Quaker City Rubber Co., Wissinoming, Philadelphia, Pa.
Republic Rubber Co., Youngstown, Ohio .
United States Rubber Co., 1790 Broadway, New York, N. Y.
Voorhees Rubber Mfg. Co., 20 Bostwick Ave., Jersey City, N. J.

PAINTS
American Paint & Supply Co., Dallas, Texas
Cook Paint & Varnish Co., 1319 Grand Ave., Kansas City, Mo. See inside back cover.
Detroit Graphite Co., Detroit, Mich. See page 61.

A complete service

TO REFINERS

We maintain warehouses and complete stocks at Dallas, TULSA, Los Angeles and Shreveport.

These convenient shipping points, each located proximately to some important field of activity, insure speedy deliveries and low freight charges.

Every refiner need is anticipated and fulfilled in the completeness of the line which is distributed through our stores; every item handled by us has won a high place in its field.

WESTCOTT & GREIS

Dallas TULSA Los Angeles
Shreveport

Some of the Products Distributed By

WESTCOTT & GREIS

LIQUID SAFETY VALVES and companion line of tank safety and conservation equipment.

Westcott Orifice Meters and Metric Ironcase Meters and Metric Drilling Well Meters.

Meriam Shock Absorbers and companion line of Meriam Products.

McDonald 2 lt., 3 Diaphram Meters equipped with 4 purging cocks for laboratory and charcoal testing.

Chaplin Fulton High and Low Pressure Regulators.

Davis Supersensitive Relief Valves and Casing Head Regulators.

Complete Stock of Bristol Charts and Recording Meters.

WESTCOTT & GREIS

Tell them where you saw the ad

E. I. Dupont de Nemours Co., Wilmington, Del.
Kuhn Paint and Varnish Works, Houston, Texas
The Philip Carey Co., Lockland, Ohio
Sherwin-Williams Co., Houston, Texas
Tnemec Paint & Oil Co., 3122 Roanoke Road, Kansas City, Mo.
St. Louis Surfacer & Paint Co., St. Louis, Mo.

PAINT, Powder
Aluminum Company of America, 2400 Oliver Bldg., Pittsburgh, Pa.
The Dampney Company of America, 50-60 Business St., Boston, Mass.

PAINT, Graphite
The Arco Co., Cleveland, Ohio
Detroit Graphite Co, Detroit, Mich. See page 61.

PAINT, Machinery
The Arco Co., Cleveland, Ohio

PAINTS, Pump
McDougall-Butler Co. Inc., Evans, Water and Norton Sts., Buffalo, N. Y.

PAINT, Red Lead
National Lead Co., 111 Broadway, New York City

PAINT, TANKS
The Arco Co., Cleveland, Ohio
Cook Paint & Varnish Co., Kansas City, Mo. See inside back cover.
Detroit Graphite Co., Detroit, Mich. See page 61.
E. I. Dupont de Nemours Co., Wilmington, Del.
Kuhn Paint and Varnish Works, Houston, Texas
St. Louis Surfacer & Paint Co., St. Louis, Mo.
Silumite Products Corp., Morton, Delaware County, Pa. See page 93.

PAINT, Tank Car
American Paint & Supply Co., Dallas, Texas
The Arco Co., Cleveland, Ohio
Cook Paint & Varnish Co., Kansas City, Mo. See inside back cover.
Detroit Graphite Co., Detroit, Mich. See page 61.
St Louis Surfacer & Paint Co., St. Louis, Mo.

PAINTS, Acid Resisting
Detroit Graphite Co., Detroit, Mich. See page 61.
Silumite Products Corp., 500 Morris Bldg, Philadelphia, Pa.

PAINTS. Concrete
Sherwin-Williams Co., Canal Road, Cleveland, Ohio.
Detroit Graphite Co., Detroit, Mich. See page 61.

PAINTS. Enamels
Cook Paint and Varnish Co., 1319 Grand Ave., Kansas City, Mo. See inside back cover.
Kuhn Paint and Varnish Works Works Houston, Texas
McDougall-Butler Co., Inc., Evans, Water and Norton Sts., Buffalo, New York
St. Louis Surfacer & Paint Co., St. Louis, Mo.

PAINTS, Steel Preservative
Silumite Products Corp., 500 Morris Bldg., Philadelphia, Pa. See page 93.
Detroit Graphite Co., Detroit, Mich. See page 61.

PAINTS, Varnish
Cook Paint and Varnish Co., 1319 Grand Ave., Kansas City, Mo. See inside back cover.
Sherwin-Williams Co., Houston, Texas

PAINT, White Lead
National Lead Co., 111 Broadway New York City

PAINTING, Spray
Beach-Russ Co., 46 Church St., New York, N. Y.
Bruner Mfg. Co., Utica, N. Y.
The DeVilbiss Mfg. Co., Toledo, Ohio
The MacLeod Co., Bogen St., Cincinnati, Ohio

PANS, Dephlegmator
The Calorizing Co., Pittsburgh, Pa.

PANS Sweating
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.

PAPER, Blue Print
A. S. Aloe Co., 513 Olive St., St. Louis, Mo.
The H. Cole Co., 24 N. High St., Columbus, Ohio
Eugene Dietzgen Co., 166 W. Monroe St., Chicago, Ill.
United States Blue Print Paper Co., 201-7 South Wabash Ave., Chicago, Ill.
New York Blue Print Paper Co., 102 Reade St., New York, N. Y.

PAPER, Filter
Beach-Russ Co., 46 Church St., New York, N. Y.
Brown Instrument Co., Wayne & Windrim Ave., Philadelphia, Pa. See page 82.
Fort Worth Laboratories, 828½ Monroe St., Fort Worth, Texas See page 84.
Griebel Instrument Co., Carbondale, Pa.

PICKS
F. W. Jesup & Co., 90-92 W. Broadway, New York City

PIPE Aluminum
Aluminum Co. of America. 2400 Oliver Bldg., Pittsburg, Pa.

PIPE, Cast Iron
American Cast Iron Pipe Co., Birmingham, Ala. See page 13.
Davis & Farnum Engineering Works, Inc., Waltham, Mass.
U. S. Cast Iron Pipe & Foundry Co., Burlington, N. J.
Walworth Mfg. Co., 142 High St., Boston, Mass.

PIPE, Covering Material
Rogers Asbestos Co., Houston. Texas
United Lead Co., 111 Broadway, New York City, New York

PIPE, Fabricated
Shaw-Kendall Engineering Co., 120-130 S. Superior St., Toledo, Ohio

PIPE Gas
Downington Iron Works, Downington, Penn.

PIPE, Riveted
John Dollinger, Jr., Inc., Beaumont, Texas
Connery & Co., Philadelphia, Pa
Dowington Iron Works, Downington, Penn.
Graver Corporation, 420 Todd Ave., East Chicago, Ind. See pages 3-33.
Titusville Iron Works Co., Titusville, Pa. See page 16.
M. N. Treadwell Co. of Ill., 208 S. LaSalle St., Chicago, Ill.

PIPE, Seamless Brass
U. T. Hungerford Brass & Copper Co., Lafayette, White and Franklin Sts., New York City

PIPE, Seamless Steel
Markle Steel Co, 506 Houston Land & Trust Bldg., Houston Texas
Lambert, George B. & Co., 570 Fulton Street, Chicago, Illinois

PIPING Power
Kellogg, M. W., Co., 90 West St., New York, N. Y.
Kelly & Jones Co., Greensburg, Pa.
Pittsburgh Valve Foundry & Construction Co, P. O. Box 1016, Pittsburg, Pa.
Power Piping Co., Beaver and Western Ave., Pittsburgh, Pa.
U. S. Cast Iron & Foundry Co., Burlington, N. J.
Walworth Mfg. Co., 142 High St., Boston, Mass.

PLANERS, Metal Working
The Cincinnati Planer Co., Cincinnati, Ohio
Underwood, H. B. Corp., 1015-1025 Hamilton St., Philadelphia, Pa.

PLANIMETERS
American Schaeffer & Budenberg Corp., Berry and 5th Sts., Brooklyn, New York. See page 64.

PLATES, Netting
Hendrick Manufacturing Co., Carbondale, Pa.

PLATES, Steel
Bethlehem Steel Co., Bethlehem. Pa.
Carnegie Steel Co., Carnegie Bldg., Pittsburgh, Pa.
Harrisburg Pipe & Pipe Bending Co. of Texas, Houston, Texas
Ryerson, Joseph T., & Son, 16th and Rockwell Sts., Chicago, Ill.
Youngstown Sheet & Tube Co., Youngstown, Ohio

PLUGS, Bull
Harrisburg Pipe & Pipe Bending Co., Harrisburg, Pa.

PLUGS, Fusible
The Lunkenheimer Co., Cincinnati, Ohio. See page 14.
Hills-McCanna Co., 2025 Elston Chicago, Ill. See page 8.

PLUGS, Still
Driver-Harris Co., Harrison, New Jersey
Ed Schwartz Mill Supply Co., New Orleans, Louisiana

POLES, Gauge
Marsh Gauge Pole Co., Titusville. Pa.
Forth Worth Laboratories, 828½ Monroe St., Forth Worth, Texas See page 84.

PREHEATERS
The Alexander Milburn Co., 1416-1428 W. Baltimore St., Baltimore, Md.
Badenhausen Corporation, 900 Victory Bldg., Philadelphia, Pa.
James Howeden & Co. of America Inc, Cunard Bldg., Wellsville. New York
Newton Process Mfg. Co., Fullerton, California
Southwestern Engineering Company, Inc., 90 West Street, New York City. See page 49.
Southwestern Engineering Corp., 1221 Hollingsworth Bldg., Los Angeles, Calif. See page 49.

PREHEATING, Torches
Tochweld Equipment Co., 224 N. Carpenter St., Chicago, Illinois

PROCESS, Lubricating Oil
Byron Jackson Pump Mfg. Co., Inc., 412 S. San Pedro St., Los Angeles, California

PROTECTION APPARATUS, Ey:
American Optical Company. 813-815 Kress Bldg, Houston, Texas

PULLEYS
American Pulley Co., 4200 Wissahichon Ave., Philadelphia, Pa.
Dick, R. and J. Company, Inc., Passaic, New Jersey
The Falls Clutch & Machinery Co., Guyahoga Falls, Ohio
The Hill Clutch Machine & Foundry Co., Cleveland, Ohio
Jones, W. A., Foundry & Machine Co., 4415 W. Roosevelt Road, Chicago, Illionois

PUMPS
American Steam Pump Company Battle Creek, Michigan
Cook Motor Co., Delaware, Ohio
Economy Pumping Machinery Co., 122-124 N. Curtis St., Chicago, Illinois
Gardner Governor Co., 100 William, Quincy, Illionis
Wm. T. Johnston Co., Cincinnati, Ohio
Lalor Fuel Oil System Co., 527-533 Colvin St., Baltimore, Md.
May Machinery Co., Second National Bank Bldg., Houston, Texas
The John H. McGowan Co., Cincinnati, Ohio
National Transit Pump & Machine Co., Oil City, Pa.
Standard Steel Works, North Kansas City, Missouri
Vogt Brothers Mfg. Co., 1402 W. Main St., Louisville, Kentucky See page 34.
Wilson-Snyder Manufacturing Co., Pittsburgh, Pa.

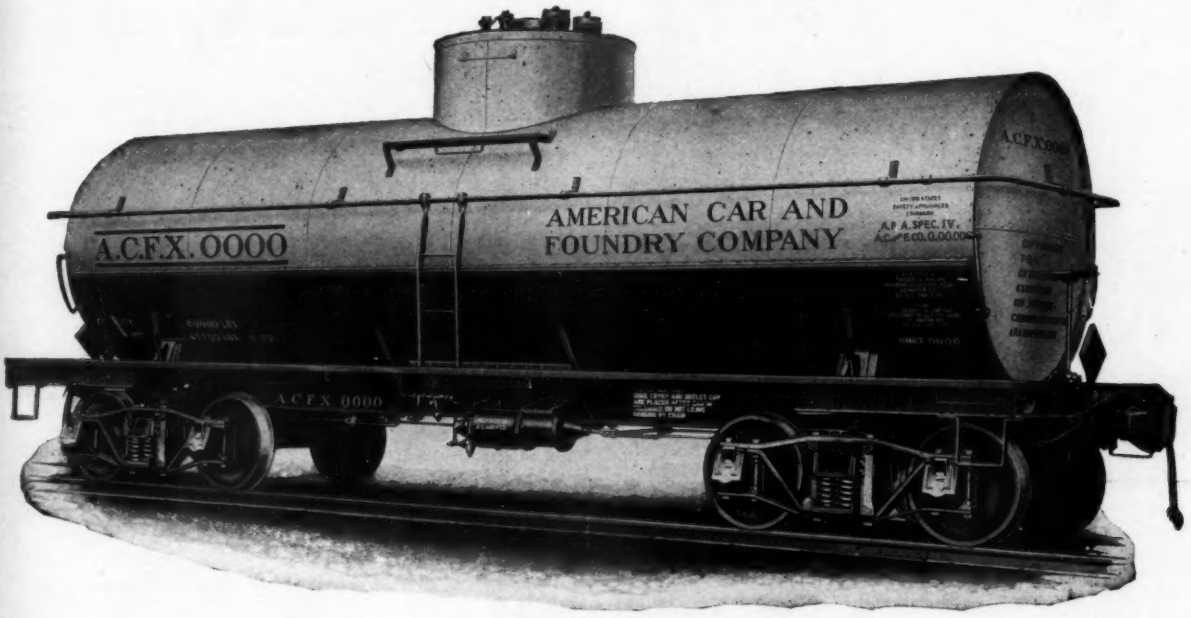
PUMPS, Air
Allen & Billmyre Co., Inc., Grand Central Palace, New York City
Sullivan Machinery Co., 122 S. Michigan Ave., Chicago, Illinois
The P. H. & F. M. Roots Co., Chicago, Ill. See inside back cover.

PUMPS, Ammonia
Dean Brothers Co., 323 W. Tenth St., Indianapolis, Ind.
De Laval Steam Turbine Co., Trenton, N. J. See page 58.
Jackson, Byron Pump Mfg. Co., 410 Sharon Bldg., San Francisco, Calif.
Worthington Pump & Machinery Corp., 115 Broadway, New York, N. Y.
York Mfg. Co., York, Pennsylvania

PUMPS, Boiler Feed
Alberger Pump & Condenser Co., 140 Cedar St., New York, N. Y.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Chicago Pump Co, 2300 Wolfram St., Chicago, Illinois
Coppus Engineering Corp., 342-48 Park Ave., Worcester, Mass.
Dean Brothers Co., 323 W. 10th St., Indianapolis, Indiana
De Laval Steam Turbine Co., Trenton, N. J. See page 58.
Economy Pumping Machinery Co., 122-124 N. Curtis St., Chicago, Illinois
Fairbanks-Morse & Co., 900 So. Wabash Ave., Chicago, Ill.
Gardner Governor Co., Quincy, Ill.
Goulds Mfg. Co., Seneca Falls, N. Y.
Kerr Turbine Co., Wellsville, N. Y.
National Steam Pump Co., Upper Sandusky, Ohio
Union Steam Pump Co., Battle Creek, Mich.
Henry Vogt Machine Co., 1402 W. Main St., Louisville, Ky. See page 34.
Wagener Steam Pump Co., Canton, Ohio
Wheeler Condenser & Engineering Co., Carteret, N. J See page 55.
Worthington Pump & Machinery Corp., 115 Broadway, New York, N. Y.

PUMPS, Cargo
Wilson-Snyder Manufacturing Co., Pittsburgh, Pa. See page 91.
Dean Brothers Co., 323 W. 10th St, Indianapolis, Indiana

PUMPS, Centrifugal
Alberger Pump & Condenser Co., 140 Cedar St., New York, N. Y.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Babcock-Wilcox and Goldie-McCulloch, Ltd., Galt, Ontario
Barrett, Haentjens & Co., Hazelton, Pa.
Beach-Russ Co., 46 Church St., New York City
Byron Jackson Pump Mfg. Co., Inc, 412 S. San Pedro St., Los Angeles, California
Chicago Pump Co., 2336 Wolfram St., Chicago, Ill.
De Laval Steam Turbine Co., Trenton, N. J. See page 58.
Dean Hill Pump Co., Anderson, Indiana
Economy Pumping Machinery Co., 122-124 N. Curtis St., Chicago, Ill.
Fairbanks, Morse & Co., 900 So. Wabash Ave., Chicago, Ill.
Frederick Iron & Steel Co., Frederick, Maryland
Ingersoll-Rand Co, 11 Broadway, New York City
Jackson, Byron Pump Mfg. Co., 410 Sharon Bldg., San Francisco, Calif.
Kerr Turbine Co., Wellsville, N. Y.
Paine, H. A., Houston, Texas
Standard Turbine Corp., Scio, New York
Swaby Mfg. Co., Chicago Ill.
Tips Foundry & Machine Co., Austin, Texas
Schutte & Koerting Co, Philadelphia, Pa. See page 39.



More Gasoline MUST Be Moved

Be Prepared!

Gasoline shipments this year have been late in starting. Meanwhile the number of automobiles in use is constantly growing, more and more trucks and passenger buses are being put into service, and many other factors, such as reduction of taxi fares, all point to unprecedented consumption of gasoline in the months to come.

Sooner or later there will be a heavy demand for tank cars. That many shippers anticipate such a demand is indicated by substantial orders for "Car Foundry" cars already booked.

We can still make prompt deliveries of both Class III and Class IV cars, because we too have prepared for the future by increasing plant facilities, but we urge all customers to place their orders without delay.

Tank car prices now are considerably under the market for materials.

American Car and Foundry Company

New York
165 Broadway

Chicago
Railway Exchange Building

St. Louis
915 Olive Street

Tell them where you saw the ad

Union Steam Pump Co., Battle Creek, Mich.
Universal Motor Co., Oshkosh, Wisconsin
Wheeler Condenser & Engineering Co., Carteret, N. J. See page 55.
Wilson Snyder Mfg. Co., Pittsburgh, Pa. See page 91.
Worthington Pump & Machinery Corp., 115 Broadway, New York, N. Y.

PUMPS, Circulating
Chicago Pump Co., 2300 Wolfram St., Chicago, Illinois
Economy Pumping Machinery Co., 122-24 N. Curtis St., Chicago, Ill.
Erwin & Co., 3734-36 Cottage Grove Ave., Chicago, Illinois
Henry Vogt Brothers Machine Co., 1402 W. Main St., Louisville, Kentucky See page 34.

PUMPS, Condensation
Chicago Pump Co., 2300 Wolfram St., Chicago, Illionois
Economy Pumping Machinery Co., 122-124 N. Curtis St., Chicago, Ill.
Erwin & Co., 3734-36 Cottage Grove Ave., Chicago, Ill.
Farnsworth Co., Norristown, Pa.

PUMPS, Force
Domestic Engine & Pump Co., Shippensburg, Pa.
Witte Engine Works, Kansas, City, Mo.

PUMPS, Fuel Oil
Beach-Russ Co., 46 Church St., New York City
Dean Brothers Co., 323 W., 10th St., Indianapolis, Indiana

PUMPS, High Pressure Still
National Steam Pump Co., Upper Sandusky, Ohio

PUMPS, Hot Oil
Blake Pump Co., Fitchburg, Mass.
Wilson-Snyder Mfg. Co., Pittsburgh, Pa. See page 91.

PUMPS, Hydraulic
Dean Brothers Co., 323 W. 10th St., Indianapolis, Indiana
Henry Vogt Brothers Machine Co., 1402 W. Main St., Louisville, Kentucky. See page 34.

PUMPS, Lead Acid
United Lead Co., 111 Broadway, New York City, New York

PUMPS, Oil
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Dean Brothers Co., 323 W. Tenth St., Indianapolis, Ind.
Fairbanks-Morse & Co., 900 So. Wabash Ave., Chicago, Ill.
Goulds Mfg. Co., Seneca Falls, N. Y.
Ingersoll-Rand Co., 11 Broadway, New York, N. Y. .....
The Maxon Premix Burner Co., Belt Ry. and S. Mulberry St., Muncie, Indiana
National Steam Pump Co., Upper Sandusky, Ohio
Wm. W. Nugent & Co., Inc., 410-412 N. Hermitage Ave., Chicago, Ill.
Roots, P. H. & F. M., Co., Connersville, Ind. See inside front cover.
Union Steam Pump Co., Battle Creek, Mich.
Henry Vogt Brothers Machine Co., 1402 W. Main St., Louisville, Kentucky. See page 34.
Wagener Steam Pump Co., Canton, Ohio
Witt, G. E. Co., 862-64 Howard St., San Francisco, California
Wilson-Snyder Manufacturing Co., Pittsburgh, Pa. See page 91.
Worthington Pump & Machinery Corp., 115 Broadway, New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, Ohio

PUMPS, Pipe Line
Economy Pumping Machinery Co., 122-124 N. Curtis St., Chicago, Illinois
Wilson-Snyder Manufacturing Co., Pittsburgh, Pa. See page 91.

PUMPS, Power
The Aldrich Pump Co., Allentown, Pennsylvania
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Dean Brothers Co., 323 W. 10th St., Indianapolis, Indiana
Fairbanks, Morse & Co., 900 So. Wabash Ave., Chicago, Ill.
Goulds Mfg. Co., Seneca Falls, N. Y.
Hercules Supply Co., Corsicana, Texas
Ingersoll-Rand Co., 11 Broadway, New York, N. Y.
Kinney Mfg. Co., 3529-3541 Washington St., Boston, Mass.
Union Steam Pump Co., Battle Creek, Mich.
Viking Pump Co., Cedar Falls, Iowa
Wheeler Condenser & Engineering Co., Carteret, N. J. See page 55.
Worthington Pump & Machinery Corp., 115 Broadway, New York, N. Y.

PUMPS, Rotary
Beach-Russ Co., 46 Church St., New York
Erwin & Co., 37 34-36 Cottage Grove Ave., Chicago, Illinois
Gould Mfg. Co., Seneca Falls, N. Y.
Kinney Mfg. Co., 3529-3541 Washington St., Boston, Mass.
Northern Fire Apparatus Co., Minneapolis, Minn.
Nugent, Wm. W., & Co., 410-12 No. Hermitage Ave., Chicago, Ill.
Roots, P. H. & F. M., Co., Connersville, Ind. See inside front cover.
Schutte & Koerting Co., Philadelphia, Pa. See page 39.
Southern Engine & Pump Co., 615 Washington Ave., Houston, Tex.
Viking Pump Co., Cedar Falls, Ia.
Western Pump Co., Davenport, Ia.
Wilgus Manufacturing Co., 1722 E. 16th St., Los Angeles, California

PUMPS, Sludge
Economy Pumping Machinery Co., 122-124 N. Curtis, Chicago, Ill.

PUMPS, Single Cylinder Steam
Blakeslee Mfg. Co., DuQuoin, Ill.

PUMPS, Simplex
Ingersoll-Rand Co., 11 Broadway, New York City

PUMPS, Steam
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Steam Pump Co., Battle Creek, Mich.
Birmingham Iron Foundry, Derby, Conn.
Dean Brothers Co., 323 W. Tenth St., Indianapolis, Ind.
Fairbanks-Morse & Co., S. Wabash Ave., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, New York, N. Y.
Llewellyn Iron Works, Los Angeles, Calif.
McGowan, John H. Co., Cincinnati, Ohio
National Supply Co., Toledo, Ohio
Oil Well Supply Co., 213-215 Water St., Pittsburgh, Pa.
Henry Vogt Brothers Machine Co., 1402 W. Main St., Louisville, Kentucky. See page 34.
Wagener Steam Pump Co., Canton, Ohio
Wheeler Condenser & Engineering Co., Carteret, N. J. See page 55.
Worthington Pump & Machinery Corp., 115 Broadway, New York, N. Y.

PUMPS, Stripping
Wilson-Snyder Manufacturing Co., Pittsburgh, Pa. See page 91.

PUMPS, Tank
Dean Brothers Co., 323 W. 10th St., Indianapolis, Indiana
Henry Vogt Brothers Machine Co., 1402 W. Main St., Louisville, Kentucky. See page 34.

PUMPS, Turbine
American Steam Pump Co., Battle Creek, Mich.
De Laval Steam Turbine Co., Trenton, N. J. See page 58.
Economy Pumping Machinery Co., 122-124 N. Curtis St., Chicago, Illinois
Goulds Mfg. Co., Seneca Falls, N. Y.
Ingersoll-Rand Co., 11 Broadway, New York, N. Y.
Jackson, Byron, Pump Mfg. Co., 410 Sharon Bldg., San Francisco, Calif.
Kerr Turbine Co., Wellsville, N. Y.
Kinney Mfg. Co., 3529-3521 Washington St., Boston, Mass.
The Terry Steam Turbine Co., Hartford, Conn.
Union Steam Pump Co., Battle Creek, Mich.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

PUMPS, Vacuum
Abbe Engineering Co., 50 Church St., New York City
Alberger Pump & Condenser Co., 140 Cedar St., New York, N. Y.
Allen & Billmyre Co., Inc., Grand Central Palace, New Pork City
American Steam Pump Co., Battle Creek, Mich.
Beach-Russ Co., 46 Church St. New York
Bury Compressor Co., 1712 Cascade St., Erie, Pa.
Chicago Pneumatic Tool Co., 6 E 44th St., New York City
Chicago Pump Co., 2336 Wolfram St., Chicago, Illinois
Crowell Mfg. Co., 319-321 Franklin Ave., Brooklyn, New York.
Dean Brothers Co., 323 W. Tenth St., Indianapolis, Ind.
Goulds Mfg. Co., Seneca Falls N. Y
Howden, James & Co. of America, Inc., 121 So. Main St., Wellsville, N. Y.
Ingersoll-Rand Co., 11 Broadway, New York City
Mesta Machine Co., Pittsburgh, Pa.
Miller Improved Gas Engine Co., Springfield, Ohio
Oil Well Supply Co., 213-215 Water St., Pittsburgh, Pa.
Perry Harry M. 702 N. Main St., Los Angeles, Calif.
The P. H. & F. M. Roots Co., Chicago, Ill See inside front cover.
The Refinery Supply Co., Fourth and Detroit Sts., Tulsa, Okla. See page 86.
Standard Turbine Corp., Scio, New York
Schutte and Koerting Co., Philadelphia, Pa. See page 39.
Sullivan Machinery Co., 122 S. Michigan Ave., Chicago, Ill.
Union Steam Pump Co., Battle Creek, Mich.
Viking Pump Co., Cedar Falls, Ia.
Wagener Steam Pump Co., Canton, Ohio
Wheeler Condenser & Engineering Co., Carteret, N. J. See page 55.
C. H. Wheeler Mfg. Co., Philadelphia, Pa.

PUNCHES
The Champion Blower & Forge Co., Lancaster, Pa.
Sculley Steel & Iron Co., Chicago, Illinois
Richard Dudgeon, Inc., 24 and 26 Columbia St., New York City

PURIFIERS, Ammonia
Frick Co., Inc., Waynesboro, Pa.
York Mfg. Co., York, Pa.

PURIFIERS, Feed Water
Brock Engineering Corp., Arcade Bldg., St. Louis, Mo.
Graver Corp., East Chicago, Ind. See pages 3-33
Permutit Co., 440 Fourth Ave., New York, N. Y.

PURIFIERS, Oil
Andrews-Bradshaw Co., Pittsburgh, Pa.
Bousman Mfg. Co. Inc., 1157-59 Plainfield Ave. N. E. Grand Rapids, Mich.
De Laval Separator Co., 165 Broadway, New York City
De Laval Steam Turbine Co., Trenton, N. J. See page 58.
The Sharples Specialty Co., 23rd and Westmoreland Sts., Philadelphia, Pa.

PYROMETERS
The Brown Instrument Co., Philadelphia, Pa. See page 82.
Eimer & Amend, Third Ave., 18 to 19 St., New York City
Fort Worth Laboratories, 828½ Monroe St., Fort Worth, Texas. See page 84.
Illinois Testing Laboratories, Inc., 141 W. Austin Ave., Chicago, Ill.
The Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia, Pa.
Bristol Co., Waterbury, Conn.
The Foxboro Co. Inc., Foxboro, Mass.
Wilson-Maeulen Co., Inc., 383 Concord Ave., New York, N. Y. See page 11.

PYROMETERS, Recording
Defender Automatic Regulartor Co., St. Louis, Mo.
The Denver Fire Clay Co., P. O. Box 1107, Denver, Colo.

RACKS, Bar
The Berger Mfg. Co., Canton, O.

RACKS, Barrel Storing
Economy Engineering Co., 2635-53 W. Van Buren St., Chicago, Ill.

RACKS, Steel
Medart Mfg. Co., Fred, St. Louis, Mo.

REAGENTS, Chemical
Eimer & Amend, Third Ave., 18 to 19 St., New York City

RECEIVERS, Air
Kansas City Structural Steel Co., Kansas City, Kansas

RECORDERS (See Instruments)

RECTIFYING COLUMNS
Southwestern Engineering Corp., 1221 Hollingsworth Bldg., Los Angeles, Calif. See page 49.

RECUPERATORS
The Calorizing Co., Pittsburgh, Pa.

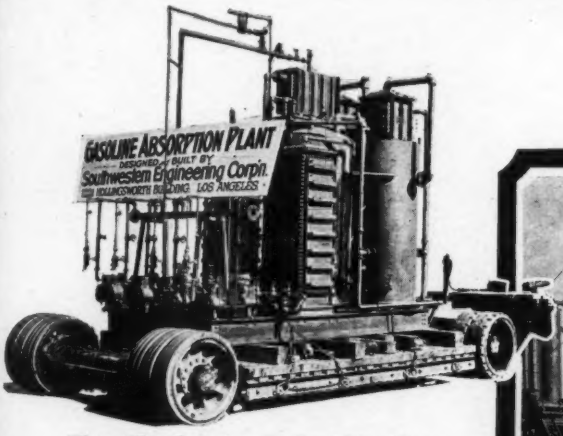
REDUCERS, Speed
The Hill Clutch Machine & Foundry Co., Cleveland, Ohio
Jones, W. A., Foundry & Machine Co., 4415 W. Roosevelt Road, Chicago, Ill.

REFRACTOMETERS
Eimer & Amend, Third Ave., 18 to 19 St., New York City

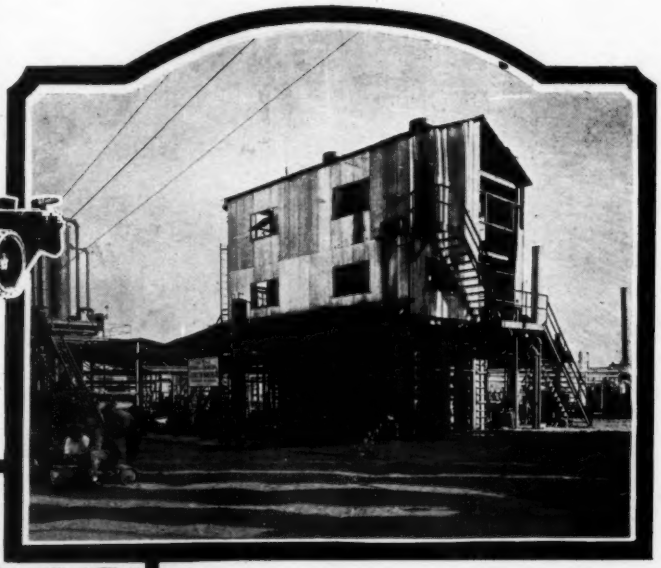
REFRACTORIES
Crescent Refractories Co., Curwensville, Clearfield County, Pa.
Eureka Fire Brick Works, Pittsburgh, Pa.
Green, A. P., Fire Brick Co., Mexico, Mo.
Quigley Furnace Specialties Co., 26 Cortlandt St., New York City See page 90.
Seaboard Refractories Co., Perth Amboy, N. J.
Wellsville Fire Brick Co., Wellsville, Mo.
Waite & Davey Co. Inc., 5 Court Square, Long Island City, N. Y.

REFRIGERATING, Machinery
Casey-Hedges Co., Chattanooga, Tenn.
Frick Co. Inc., Waynesboro, Pa.
Hope Engineering & Supply Co., Mt. Vernon, Ohio
Ingersoll-Rand Co., 11 Broadway, New York, N. Y.
Vilter Mfg. Co., 1194-1196 Clinton St., Milwaukee, Wis. See page 95.
Henry Vogt Machine Co., Louisville, Ky. See page 34.
York Mfg. Co., York, Pa.

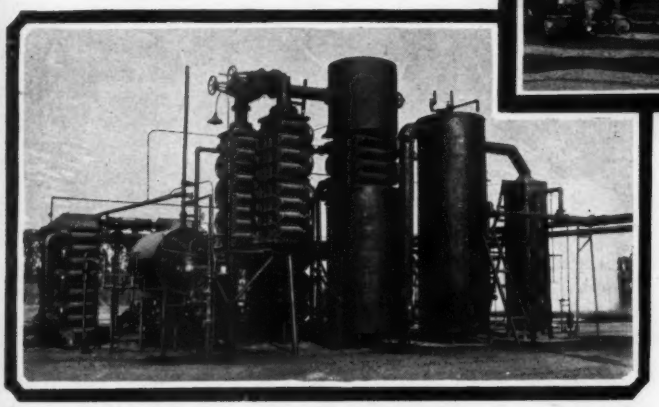
REGULATORS
Cash, A. W., Co., P. O. Box 35, Decatur, Illinois
Foster Engineering Co., 109-117 Monroe St., Newark, N. J.
The Refinery Supply Co., Fourth and Detroit Sts., Tulsa, Okla. See page 86.
Taylor Instrument Co., Rochester, N. Y. See page 90.



The "Southwestern" Portable Gas Absorption Plant, 2000 gallon capacity, consisting of standard equipment throughout.



60,000 Gallon Gasoline Absorption Plant



A 20,000-gallon "Southwestern" Gasoline Absorption Unit, showing Gas Coolers, Gasoline Separator, Condensers, Dephlegmator, Evaporator, and Pre-Heater.

"Southwestern" ABSORPTION PLANTS

"Southwestern" Absorption Plants are designed and built to obtain certain specific results under the conditions prevailing on your lease, by men long experienced in this special work. We build portable and stationary plants of any size and capacity desired, in part or complete, in any field in the United States, and guarantee results; maintaining a corps of thoroughly trained engineers who are constantly in touch with these fields and in position to render our clients an extraordinary service.

REFINERY EQUIPMENT
We design, plan and build complete apparatus of all types for refinery service.
Tell us your problems—we can help you.

Write for our Catalog "R" of Refinery Apparatus

Southwestern Engineering Corporation

1221 Hollingsworth Bldg., Los Angeles, California

EASTERN OFFICE:
Southwestern Engineering Co., Inc., 90 West Street, New York City

Tell them where you saw the ad

REGULATORS, Automatic Pressure
Fort Worth Laboratories, 828½ Monroe St., Fort Worth, Texas. See page 84

REGULATORS Automatic Temperature
Fort Worth Laboratories, 828½ Monroe St., Fort Worth, Texas. See page 84.

REGULATORS, Back Pressure
The Chaplin-Fulton Mfg. Co., 28-34 Penn Ave., Pittsburgh, Pa. See page 94.

REGULATORS, Boiler Feed
McDonough Coal Saving Corp., Detroit, Mich.
The C. E. Squires Co., E. 40th St. and Kelley Ave., Cleveland, O.
The Williams Gauge Co., Pittsburgh, Pa.
Witt, G. E. Co., 862-64 Howard St, San Francisco, Calif.

REGULATORS, Combustion
Smoot Engineering Corp., 136 Liberty St., New York City

REGULATORS, Damper
F. A. Burrows Mfg. Co., York, Pa.
Coppus Engineering Corp., 342-348 Park Ave., Worcester, Mass.
Defender Automatic Regulator Co., St. Louis, Mo.
Julian d'Este Co., 26 Canal St., Boston, Mass.
Engineer Co., 17 Battery Place, New York, N. Y.
Fulton Co., Knoxville, Tenn.
Kelly & Jones Co., Greensburg, Pa.
Power Turbo-Blower Co., 45th St. and Madison Ave., New York, N. Y.
James L. Robertson & Sons, 78-80 Murray St., New York City
Powers Regulator Co., 2776 Greenview Ave., Chicago, Ill.
Spencer Regulator Co., Salem, Mass.
Walworth Mfg. Co., 142 High St., Boston, Mass.
Watts Regulator Co., 250-252 Lowell St., Lawrence, Mass.

REGULATORS, Draft
McDonough Coal Saving Corp., Detroit, Mich.

REGULATORS, Engine
Watts Regulator Co., 250-252 Lowell St., Lawrence, Mass.

REGULATORS, Feed Water
F. A. Burrows Mfg. Co., York, Pa.
Chaplin-Fulton Mfg. Co., 28-34 Penn Ave., Pittsburgh, Pa. See page 94.
Kitts Mfg. Co., 19 W. Seneca St., Oswego, N. Y.
Northern Equipment Co., Erie, Pa.
Powers Regulator Co., 2776 Greenview Ave., Chicago, Ill.
Tagliabue, C. J., Mfg. Co., 18-88 33rd St., Brooklyn, N. Y. See page 56.
Watts Regulator Co., 250-252 Lowell St., Lawrence, Mass.

REGULATORS, Field Dynamo
The Cutler-Hammer Mfg. Co., Milwaukee, Wis.

REGULATORS, Gas
The Chaplin-Fulton Mfg. Co., 28-34 Penn Ave., Pittsburgh, Pa. See page 94.
Equitable Meter Co., 422-434-444 First Ave, Pittsburgh, Pa.

REGULATORS, Heat
American Thermostat Co., Newark, N. J.
Wilgus Mfg. Co., 1722 E. 16th St. Los Angeles, Calif.

REGULATORS, Auxiliary Pressure
Watts Regulator Co., 250-252 Lowell St., Lawrence, Mass.

REGULATORS, Oil Level
The Chaplin-Fulton Mfg. Co., 28-34 Penn Ave., Pittsburgh, Pa. See page 94.

REGULATORS, Pressure
The Chaplin-Fulton Mfg. Co., 28-34 Penn Ave., Pittsburgh, Pa. See page 94.
Crane Co., 836 So. Michigan Ave., Chicago, Ill.
Davis, G. M., Regulator Co., 439 Milwaukee Ave., Chicago, Ill.
Fisher Governor Co, Marshalltown, Iowa. See page 56.
Kelly & Jones Co., Greensburg, Pa.
Klipfel Mfg. Co., Chicago, Ill.
Northern Equipment Co., Erie, Pa.
Powers Regulator Co., 2776 Greenview Ave., Chicago, Ill.
Smoot Engineering Corp., 136 Liberty St., New York City
Sundh Electric Co. Inc, No. 5 Avenue C, Newark, N. J.
Tabliabue, C. J., Mfg. Co., 18-88 33rd St., Brooklyn, N. Y. See page 56.
Walworth Mfg. Co., 142 Hgih St., Boston, Mass.

REGULATORS, Speed
Sundh Electric Co. Inc., No. 5 Avenue C, Newark, N. J.
The Cutler-Hammer Mfg. Co., Milwaukee, Wis.

REGULATORS, Steam Pressure
Julian d'Este Co., 26 Canal St., Boston, Mass.

REGULATORS, Stoker
McDonough Coal Saving Corp., Detroit, Mich.

REGULATORS, Temperature
American Schaeffer & Budenberg Corp., Berry and S. 5th Sts., Brooklyn, N. Y. See page 64.
Bristol Co., Waterbury, Conn.
Brown Instrument Co., Wayne and Windrim Ave., Philadelphia, Pa. See page 82
Crane Co., 836 So. Michigan Ave, Chicago, Ill.
Foxboro Co., Foxboro, Mass.
Fulton Co., Knoxville, Tenn.
Powers Regulator Co., 2776 Greenview Ave., Chicago, Ill.
Saico Co. Inc., 9 Barclay St, New York, N. Y.
Tabliabue, C. J., Mfg. Co., 18-88 33rd St., Brooklyn, N. Y. See page 56.
Taylor Instrument Co., Rochester, N. Y. See page 90.
Wilson-Maeulen Co. Inc., 383 Concord Ave., New York, N. Y. See page 11

REGULATORS, Vacuum
The Chaplin-Fulton Mfg. Co., 28-34 Penn Ave., Pittsburgh, Pa. See page 94.

REGULATORS Water Heaters
Equitable Meter Co., 422, 434, 444 First Ave., Pittsburgh, Pa.

REGULATORS, Water Level
Klipfel Mfg. Co., Chicago, Ill.
Northern Equipment Co., Erie, Pa.

RESPIRATORS
American Optical Co., 813-815 Kress Bldg., Houston, Texas
Pulmosan Safety Equipment Co., 45 Willoughby St., Brooklyn N. Y. See page 83.

RETORT
L. O. Koven & Bros. Inc., 154 Ogden Ave., Jersey City, N. J.

RETURN BENDS
Ohio Steel Foundry Co., Springfield, Ohio. See page 41.

RETURN SYSTEMS, Condensation
Northern Equipment Co., Erie, Pa

RINGS, Chemical
Acme Brick Co., Ft. Worth, Texa

RIVETERS Pneumatic
John F. Allen Co., 370 Gerard Ave., New York, N. Y.
Bethlehem Steel Co., Bethlehem Pa.
Chicago Pneumatic Tool Co., 6 E. 44th St., New York City, N. Y.
Cleveland Pneumatic Tool Co., 3734 E. 78th St., Cleveland, Ohio
Ingersoll-Rand Co., 11 Broadway, New York, N. Y.

RIVETS
The Champion Rivet Co., Cleveland, Ohio
Harrisburg Pipe & Pipe Bending Co. of Texas, Houston, Texas
Russell, Burdsall & Ward Co., Port Chester, New York
Ryerson & Son, Joseph T., 16th and Rockwell Sts., Chicago, Ill.

RIVET, Sets
Sculley Steel & Iron Co., Chicago, Ill.

RODS, Pump
Ed Schwartz Mill Supply Co., New Orleans, La.

ROOFING Corrugated
Johns-Manville Inc., Madison Ave. at 41st St., New York City

RUBBER GOODS, Mechanical
Anchor Packing Co., 204-206 Lafayette Bldg., Philadelphia, Pa.
Boston Woven Hose & Rubber Co., Cambridge, Mass.
Cincinnati Rubber Mfg. Co., Cincinnati, Ohio
Garlock Packing Co., Palmyra, N. Y. See page 57
Gutta Percha & Rubber Co., New York, N. Y.
Hercules Supply Co., Corsicana Texas
Jenkins Bros., 80 White St., New York, N. Y.
Manhattan Rubber Mfg. Co., Passaic, N. J.
New York Belting & Packing Co, 91-93 Chambers St., New York, N. Y.
Quaker City Rubber Co., 624 Market St., Philadelphia, Pa.
United States Rubber Co., 1790 Broadway, Nek York, N. Y.

RULES
The Lufkin Rule Co., Saginaw Mich.

RULES, Slide
Gilson Slide Rule Co., Niles, Mich

RUNWAYS, Tank Car
Irving Iron Works Co., Long Island City, N. Y.

SANITARY, Equipment
Manufacturing Equipment & Engineering Co., Boston, Mass.

SAWS, Band
Stockbridge Machine Co., 68 Abbott St., Worcester, Mass.

SCALES, Fuel Oil
Ernest H. Duvivier, 30 Church St., New York City.
Chatillon, John & Sons, 85 to 93 Cliff St., New York City, N. Y.
Gilson Slide Rule Co., Niles, Mich.

SCOOPS
F. W. Jesup & Co., 90-92 W. Broadway, New York City.

SCREENS, Water Traveling
Chain Belt Co., Milwaukee, Wis.
Hendrick Mfg. Co., Carbondale, Pa.

SCRUBBERS
American Gas Construction Co., Newton, Iowa.
Bartlett-Hayward Co., Baltimore Md.

SEPARATORS
Elliott Co., Jeanette, Pa.
The Griscom-Russell Co., 94 West St., New York City. See page 9
United Iron Works, Kansas City Mo. See page 95
The D. T. Williams Valve Co. Cincinnati, Ohio.

SEPARATORS Condensation
Farnsworth Company, Norristown Pa.

SEPARATORS, Gasoline
Southwestern Engineering Corp. 1221 Hollingsworth Bldg., Los Angeles, Calif See page 49.
Kansas City Structural Steel Co., Kansas City, Kansas.
The Standard Boiler & Plate Iron Co., Niles, Ohio.

SEPARATORS, Oil
Cochrane Corp., 3130 N. Seventeenth St., Philadelphia, Pa.
Columbian Steel Tank Co., 1401-1631 W. Twelfth St., Kansas City, Mo.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
De Laval Steam Turbine Co., Trenton, N. J. See page 58.
The Petroleum Iron Works Co., of Ohio, Sharon, Pa.
Pittsburgh Valve Foundry & Construction Co., P. O. Box 1016, Pittsburgh, Pa.
Pioneer Tank & Boiler Co., Tulsa, Okla. See page 83.
Schutte & Koerting Co., Philadelphia, Pa. See page 39.
Smith Separator Co., Tulsa, Okla.
Walworth Mfg. Co., 142 High St., Boston, Mass.

SEPARATORS, Steam
Cochrane Corp., 3130 N. Seventeenth St., Philadelphia, Pa.
Crane Co., 836 S. Michigan Ave., Chicago, Ill.
Farnsworth Co., Norristown, Pa.
Griscom-Russell Co., 90 W. St., New York City. See page 9.
Hoppes Mfg. Co., 19 Larch St., Springfield, Ohio.
National Pipe Bending Co., New Haven, Conn.
National Valve & Mfg. Co., Pittsburgh, Pa.
Nicholson, W. H., & Co., 12 Oregon St., Wilkes-Barre, Pa.
Strong, Carlisle & Hammond Co., 326 Frankfort St., Cleveland, O.
Swartwout Co., P. O. Box 61, E. Cleveland, Ohio.
Walworth Mfg. Co, 142 High St., Boston, Mass.
Paine, H. A., Houston, Texas.
Power Plant Specialty Co., 440 S. Dearborn St., Chicago, Ill.
James L. Robertson & Sons, 78-80 Murray St., New York City, N. Y.

SEPARATORS, Water
Bousman Mfg. Co., Inc., 1157-59 Plainfield Ave. N. E., Grand Rapids, Mich

SETTINGS, Boiler
John O'Brien Boiler Works Co., 11th to 13th Mullanphy to Howard St., St. Louis, Mo.

SHAFT COUPLINGS
The Falk Corp., Milwaukee, Wis.

SHAFTING
The Falls Clutch & Machinery Co., Cuyahoga Falls, Ohio.
The Hill Clutch Foundry & Machine Co., Cleveland, O.
Sculley Steel & Iron Co., Chicago, Ill.

SHEAVES
The Falls Clutch & Machinery Co., Cuyahoga Falls Ohio.
The Hill Clutch Machine & Fdry. Co., Cleveland, Ohio.

SHELLAC
Carlton, A. S., 27 Haymarket Square, Boston, Mass.

SHELVING, Metal
The Berger Mfg. Co., Canton, O.
Edward J. Darby & Son, Inc., 317 Vine St., Phila., Pa.
Medart Mfg. Co., Fred, St. Louis, Mo.

SHINGLES, Metallic
The Berger Mfg. Co., Canton, O.

SHOCK ABSORBERS, Gage
Fort Worth Laboratories, 828½ Monroe St., Fort Worth, Texas. See page 84

SHOVELS
F. W. Jesup & Co., 90-92 W. Broadway, New York City.
Wyoming Shovel Works, Wyoming, Pa.

SIEVES, Testing
Newark Wire Cloth Co., 351-365 Verona Ave., Newark, N. J.

SIGNS
Mine Safety Appliance Co., Chamber of Commerce Bldg., Pittsburgh, Pa. See page 85.
Ready Sign Co., 39 E. 17th St., New York City.

Service

When a plant superintendent is in need of supplies, he wants immediate shipment, QUICK SERVICE. We are in position to give this service. A complete line of OIL AND GAS TESTING APPARATUS, REFINERY AND GAS PLANT SUPPLIES, COMMERICIAL AND REAGENT CHEMICALS AND POWER PLANT SPECIALTIES carried in stock at Wichita Falls. Some of the more important listed below:

C. J. TAGLIABUE MFG. CO.
Temperature Recorders and Controllers
Oil Testing Apparatus
Power Plant and Laboratory Specialties

THE JOS. W. HAYS CORP.
Gas Analyzers and Power Plant Specialties

THE MERIAM COMPANY
Manometers and Power Plant Specialties

THE BROWN INSTRUMENT COMPANY
Indicating and Recording Pyrometers
Power Plant Specialties

J. T. BAKER CHEMICAL COMPANY
Bakers CP Analyzed Chemicals

THE MATHIESON ALKALI WORKS, (INC.)
Heavy Chemicals

CORNING GLASS WORKS
Pyrex Laboratory and Industrial Glassware

KIMBLE GLASS COMPANY
Laboratory Glassware

COORS PORCELAIN COMPANY
Laboratory and Industrial Porcelain

DENVER FIRE CLAY COMPANY
Fire Brick and Refractories

JAS. P. MARSH COMPANY
Spring Gauges and Power Plant Specialties

BUFFALO METER COMPANY
Niagara Flow Meters

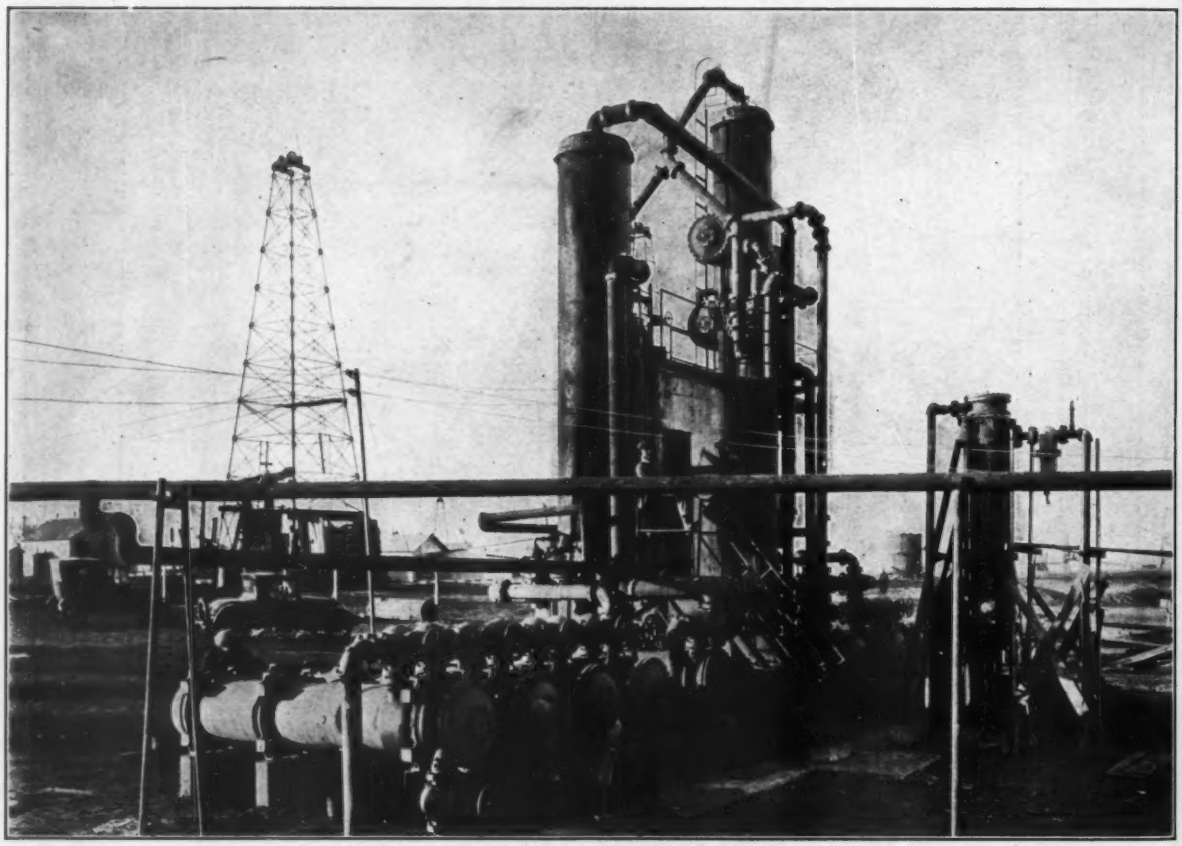
HILLS-McCANNA COMPANY
Non-Corrosive Metal Specialties

EMERSON APPARATUS COMPANY
Fuel Calorimeters

GREENE BROTHERS
WICHITA FALLS, TEXAS

Bra

Gasoline Abs



Complete BRAUN distillation units and absorbers in the Tonkawa

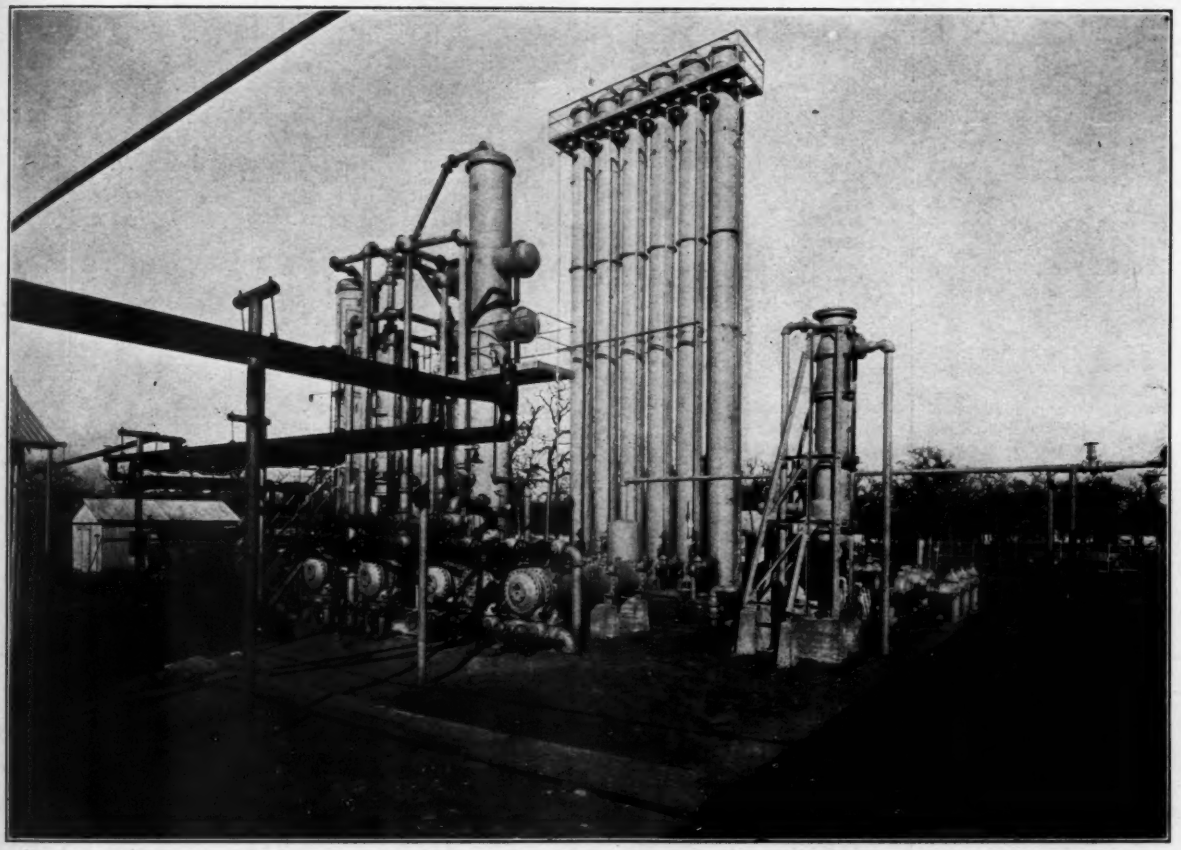
C. F. Braun & Co.

Manufacturing Mechanical Engineers
Factory & Executive Offices - Alhambra, Cal.
Midcontinent District Office - Tulsa, Okla.

Tell them where you saw the ad

un

orption Units



in two recently erected gasoline absorption plants
and Cromwell fields

C. F. Braun & Co.

Manufacturing Mechanical Engineers
Factory & Executive Offices - Alhambra, Cal.
Midcontinent District Office - Tulsa, Okla.

Tell them where you saw the ad

SILICA GEL
Silica Gel Corp., Garrett Bldg., Baltimore, Md.

SKYLIGHTS
Dee, William V. Co., 729 Union Ave., Bridgeport, Conn.

SOFTENERS, Water
Chicago Bridge & Iron Works, 2131 Transportation Bldg., Chicago, Ill.
Cochrane Corp., 3130 N. 17th St., Philadelphia, Pa.
Dodge Mfg. Corp., Mishawaka, Ind.
International Filter Co., 333 W. 25th Place, Chicago, Ill.
Babcock-Wilcox and Goldie-McCulloch, Ltd., Galt, Ontario.
Graver Corp., East Chicago, Ind. See pages 3-33.
Indiana Air Pump Co., 816 Indiana Pythian Bldg., Indianapolis, Ind.
Paine, H. A., Houston, Texas.
Permutit Co., 440 Fourth Ave., New York, N. Y.
Power Plant Specialty Co., 440 S. Dearborn St., Chicago, Ill.
Wm. B. Scaife & Sons Co., Oakmont, Pa.

SOLDERING, Supplies
L. B. Allen Co., Inc., 4519-4529 N. Lincoln St., Chicago, Ill.
Economy Welding Machine Co., 5-9 W. 20th St., Kansas City, Mo.

SPADES
F. W. Jesup & Co., 90-92 W. Broadway, New York City.

SPECIALTIES, Steam
Cash, A. W., Co., P. O. Box 35, Decatur, Ill.
Cochrane Corp., 3130 N. 17th St., Philadelphia, Pa.
Fulton Co., Knoxville, Tenn.
Golden-Anderson Valve Specialty Co., 1228 Fulton Bldg., Pittsburgh, Pa.
Graver Corp., 414 Todd Ave., East Chicago, Ind. See pages 3-33.
Lunkenheimer Co., Cincinnati, O. See page 14.

SPECIFIC GRAVITY, Apparatus
Fort Worth Laboratories, 828½ Monroe St., Fort Worth, Texas. See page 84.

SPRAY, Nozzles
Schutte & Koerting Co., Philadelphia. Pa. See page 39.

SPRAYS, Paint
Chicago Pneumatic Tool Co., 6 E. 44th St., New York City.
DeVilbiss Mfg. Co., 300 Phillis Ave., Toledo, Ohio.
Macleod Co., 2232 Bogen St., Cincinnati, Ohio.
Spray Engineering Co., 60 I. St., New York.

SPRINGS
Chatillon, John & Sons, 85 to 93 Cliff St., New York City, N. Y.

SPRINKLERS
Central Automatic Sprinkler Co., 5146-47 Delancey St., Philadelphia, Pa.
Globe Automatic Sprinkler Co., 2035 Washington Ave., Phila, Pa.
Thompson Mfg. Co., 2251 E. 7th St., Los Angeles, Calif.
Grinnell Co., Providence, R. I.

SPROCKETS
Chain Belt Co., Milwaukee, Wis.
Morse Chain Co., Ithaca, N. Y.

SMOKE, Preventers
Scharf Smoke Preventing Co., Ypsilanti, Mich.

SMOKE, Stacks
Davis, J. F., Harris Trust Bldg., Chicago, Ill.
John Dollinger, Jr., Inc., Beaumont, Texas.
The Griscom-Russell Co., 94 West St., New York City. See page 9.
The Standard Boiler & Plate Iron Co., Niles, Ohio.
M. H. Treadwell Co. of Ill., 208 S. LaSalle St., Chicago, Ill.
Connery & Company, Inc., Philadelphia, Pa.
Downington Iron Works, Downington, Pa.
Duff Patents Co. Inc., 918 Frick Bldg., Pittsburgh, Pa.
John O'Brien Boiler Works Co., 11th to 13th Mullanphy to Howard St., St. Louis, Mo.
Prospect Boiler Co., New Brunswick, N. J.

STARTERS, Electric Motor
The Cutler-Hammer Mfg. Co., Milwaukee, Wis.

STEEL
Crucible Steel Co. of America, Pittsburgh, Pa.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.

STEEL, Buildings
Austin Co., Cleveland, Ohio
Blaw-Knox Co., 624 Farmers Bank Bldg., Pittsburgh, Pa. See page 20.
Ft. Worth Steel & Machine Co., Ft. Worth, Texas. See page 84.

STEEL Cold Rolled
Sculley Steel & Iron Co., Chicago, Ill.

STEEL, Calorized
The Calorizing Co., Pittsburgh, Pa.

STEEL, Carbon
Colonial Steel Co., Pittsburgh, Pa

STEEL EQUIPMENT, Office
Terrel's Equipment Co., Grand Rapids, Mich.

STEEL, Fabricated Structural
Bethlehem Steel Co., Bethlehem Pa.

STEEL PLATE, Construction
American Tank Co., Dallas, Texas
Biggs Boiler Works Co., Case Ave. and Newton St., Akron, Ohio.
Black, Sivalls & Bryson, Bartlesville, Okla.
Brownell Co., Dayton, Ohio
Butler Mfg. Co., Kansas City, Mo
Casey-Hedges Co., Chattanooga, Tenn.
Chicago Bridge & Iron Works, 2131 Transportation Bldg., Chicago, Ill.
Coatesville Boiler Works, Coatesville, Pa.
Gantz Tank Co., Sapulpa, Okla.
John Dollinger Jr., Inc., Beaumont, Texas
Duff Patents Co. Inc., 918 Frick Bldg., Pittsburgh, Pa.
Erie City Iron Works, Erie, Pa.
Graver Corp., 414 Todd Ave., East Chicago, Ind. See pages 3-33.
Hammond Iron Works, Warren, Pa.
Houston Structural Steel Co., Houston, Texas.
Lancaster Iron Works, Inc., 560 So. Prince St., Lancaster, Pa.
Llewellyn Iron Works, Los Angeles, Calif.
Maloney Tank Co., Tulsa, Okla.
McAleenan Corp., 25th and R. R. Sts., Pittsburgh, Pa.
McNamara Brothers Co., Westport Baltimore, Md.
Meehan Boiler & Construction Co., Lowellville, Ohio
North American Car Co., 327 So. LaSalle St., Chicago, Ill. See page 96.
Petroleum Iron Works Co., Sharon, Pa.
Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa.
Riter-Conley Co., Oliver Bldg., Pittsburgh, Pa.
Standard Boiler & Plate Iron Co., Niles, Ohio
Titusville Iron Works Co., Titusville, Pa. See page 16.
United Iron Works, Kansas City, Mo. See page 95.
M. H. Treadwell Co. of Ill., 208 S. LaSalle St., Chicago, Ill.
Walsh & Weidner Boiler Co., Chattanooga, Tenn.
Wyatt Metal & Boiler Works, Dallas, Texas. See page 17.

STEEL, Structural
Eastern Steel Co., Pottsville, Pa.
Markle Steel Co., Houston, Texas
Superior Machine & Boiler Works, 840-50 W. Superior St., Chicago, Ill.
United Iron Works, Inc., Kansas City, Mo. See page 95.

STEEL, Tool
Colonial Steel Co., Pittsburgh, Pa.
Hobson, Houghton & Co., 83 Beekman St., New York, N. Y.
Vanadium Alloys Steel Co., Latrobe, Pa.

STEMS, Valve
Ed Schwartz Mill Supply Co., New Orleans, La.

STILLS
E. B. Badger & Sons Co., Boston 14, Mass.
Bethlehem Shipbuilding Corp. Ltd., Bethlehem, Pa.
Biggs Boiler Works Co., Akron, Ohio
Blaw-Knox Co., 624 Farmers Bank Bldg., Pittsburgh, Pa. See page 20.
Bousman Mfg. Co. Inc., 1157-59 Plainfield Ave., N. E. Grand Rapids, Mich.
Chicago Bridge & Iron Works, Chicago, Ill.
Downington Iron Works, Downington, Pa.
Kansas City Structural Steel Co., Kansas City, Kansas
Kaw Boiler Works Co., Kansas City, Mo.
M. W. Kellogg Co., Jersey City, N. J.
McNamara Brothers Co., Westport, Baltimore, Md.
McNamar Boiler & Mfg. Co., Bridgeport, Ill.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Petroleum Iron Works, Sharon, Pa.
Pioneer Tank & Boiler Co., Tulsa, Okla. See page 83.
Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa.
Power Specialty Co., 111 Broadway, New York City
Schutte & Koerting Co., Philadelphia, Pa. See page 39.
The Standard Boiler & Plate Iron Co., Niles, Ohio
M. H. Treadwell Co. of Ill., 208 S. LaSalle St., Chicago, Ill
United Iron Works, Inc., Kansas City, Mo.
Henry Vogt Machine Co., Louisville, Ky. See page 34.
Wyatt Metal & Boiler Works, Dallas, Texas. See page 17.

STILLS, Pressure
Bethlehem Shipbuilding Corp., Bethlehem, Pa.
Biggs Boiler Works Co., Akron, Ohio
Blaw-Knox Co., 624 Farmers Bank Bldg., Pittsburgh, Pa. See page 20.
Chicago Bridge & Iron Works, Chicago, Ill.
Kansas City Structural Steel Co., Kansas City, Mo.
Kow Boiler Works Co., Kansas City, Mo.
M. W. Kellogg Co., Jersey City, N. J.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Petroleum Iron Works, Sharon, Pa.
Henry Vogt Machine Co., Louisville, Ky. See page 34.

STILLS, Steam
C. F. Braun & Co., Alhambra, Cal. See pages 52-53.
Kansas City Structural Steel Co., Kansas City, Kansas
Southwestern Engineering Corp., 1221 Hollingworth Bldg., Los Angeles, Calif. See page 49.

STOKERS
James McMillan & Co., 114 Clarkson St., Chicago, Ill.
Riley, Sanford Stoker Co., Worcester, Mass.
Marion Machine, Foundry & Supply Co., Marion, Ind.
The M. A. Hofft Co., 814 W. Washington Ave., Indianapolis, Ind.
Vogt Bros. Mfg. Co., 1402 W. Main St, Louisville, Ky.

SUPERHEATERS
Badenhausen Corp., 900 Victory Bldg., Philadelphia, Pa.
Power Specialty Co., 111 Broadway, New York City
Superheater Co., 17 E. 42nd St., New York City

STUDS, Metal
The Berger Mfg. Co., Canton, O.

STRAINERS, Oil
Barnett, Haentjens & Co., Hazelton, Pa.
Buffalo Meter Co., 2917 Main St., Buffalo, N. Y.
Cash, A. W., Co., P. O. Box 35, Decatur, Ill.
Edward J. Darby & Son Inc., 317 Vine St., Philadelphia, Pa.
N. C. Davison Gas Burner & Welding Co., 2939 Smallman St., Pittsburgh, Pa.
Elliott Co., Jeannette, Pa.
Fisher Governor Co., Marshalltown, Iowa. See page 12.
Manning, Maxwell & Moore, Inc., 100 E. 42nd St., New York City
The Maxon Premix Burner Co., Belt Ry. & S. Mulberry St., Muncie, Ind.
Morse Dry Dock & Repair Co., Brooklyn, N. Y.
The Plouff Corp., Boston, Mass.
Wilgus Mfg. Co., 1722 16th St., Los Angeles, Calif.

STRAINERS, Water
Rosedale Foundry & Machine Co., Columbus and Preble Av., North Side, Pittsburgh, Pa.

STOCKS AND DIES
The Armstrong Mfg. Co., Bridgeport, Conn.

STOPPERS
Fort Worth Laboratories, 828½ Monroe St, Fort Worth, Texas. See page 84.

SUPPLIES, Drafting Room
The C. F. Pease Co., 813-821 N. Franklin St., Chicago, Ill.

SUPPLIES, Engineering
The C. F. Pease Co., 813-821 N. Franklin St., Chicago, Ill.

SWING LINE, Equipment
The Oil Conservation Engineering Co., Cleveland, Ohio. See page 10.

SWITCHES, Flood
The Cutler-Hammer Mfg. Co., Milwaukee, Wis.

SWITCHES, Pressure
The Cutler-Hammer Mfg. Co., Milwaukee, Wis.
Sundh Electric Co. Inc., No. 5 Avenue C, Newark, N. J.

SWITCHBOARDS
Engberg's Electric & Mechanical Works, St. Joseph, Mich.
General Electric Co., Schenectady, N. Y.
The Ideal Electric & Mfg. Co., Mansfield, Ohio

SYPHONS, Steam Jet
Schutte & Koerting Co., Philadelphia, Pa. See page 39.

TACHOMETERS
American Schaeffer & Budenberg Corp., Berry and S. 5th Sts., Brooklyn, N. Y.
The Brown Instrument Co., Philadelphia, Pa.

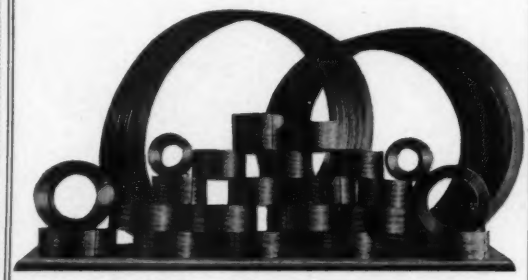
TANKS
American Gas Construction Co., Newton, Iowa
American Tank Co., Dallas, Texas
Bethlehem Shipbuilding Corp. Ltd., Bethlehem, Pa.
Biggs Boiler Works Co., Case Ave. and Newton St., Akron, Ohio
Butler Mfg. Co., Kansas City, Mo.
Casey-Hedges Co., Chattanooga, Tenn.
Chicago Bridge & Iron Works,

(Cross Section of Metallo "Refinery Type" Gasket)

Metallo "Refinery Type" Gaskets

favored by large oil refinery

The varied use of Metallo "Refinery Type" Gaskets by one of the large independent oil refineries (as shown by photograph of shipment below) is due to the dependable construction illustrated in the above cross-section.



NO matter whether you use the Fleming, Burton, Isom, Coast, Dubbs, Cross, Mutual Jenkins or Lewis cracking process, you can rely on the Metallo "Refinery Type" gasket for hand-hole, manhole, tongue and groove, male and female joints.

The construction of this gasket with its double jacket of corrugated Monel Metal, steel or other metal, and filling of asbestos, is particularly adaptable for any joints on cracking stills where the pressures are up to 900 pounds and temperatures up to 1200 degrees Fahrenheit.

The Metallo "Refinery Type" gasket is made in the ring type for manhole covers on stills and for extra heavy flanges. For tongue and groove joints, male and female flanges, etc., it is designed to fit loosely in the groove, allowing for expansion and contraction.

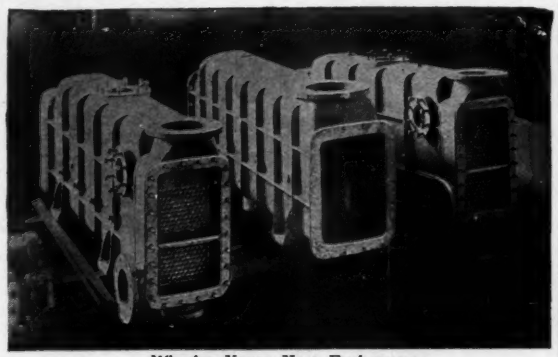
The use of Monel Metal or deep drawn steel for the jacket insures a gasket that can be compressed and hold tight under high pressures and still have the flexibility to allow for contraction and expansion. And, of course, complete immunity to chemical action is had in the cracking processes by the use of Monel. We however, recommend deep drawn steel for a jacket. That metal has proven very satisfactory to every practical purpose in cracking processes.

Write for booklet describing the entire line of Metallo gaskets for every use.

METALLO GASKET COMPANY

242 Lafayette St.,
NEW YORK CITY

Factory: New Brunswick, N. J.



Wheeler Vapor Heat Exchangers

WHEELER

Heat Transfer Equipment For Oil Refineries

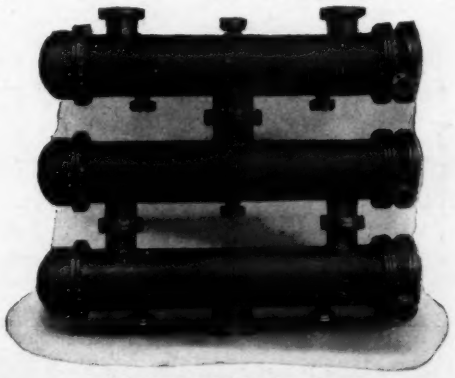
USES the hot vapors and residuum to heat the incoming crude oil, and will often save as much as 40 per cent of the heat supplied to the still.

The scientific design of Wheeler apparatus makes it possible to obtain a given capacity in the smallest space and with the least weight of apparatus.

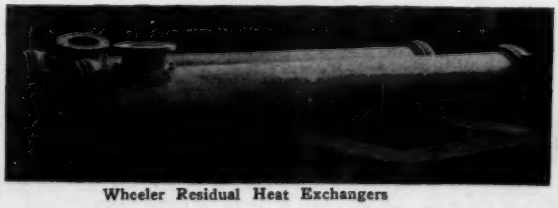
Short straight tubes and removable tube heads make inspection or cleaning easy. Deposits may be removed from the tubes with ordinary boiler tube cleaners.

The Wheeler Condenser & Engineering Co. manufactures all types of heat transfer equipment for oil refineries, including residual heat exchangers, partial condensers, vapor heat exchangers, final condensers, tar coolers, oil coolers, and special heat transfer equipment. The Wheeler Condenser & Engineering Co. also manufactures complete casing head gasoline plants in compact units of high salvage value.

WHEELER CONDENSER & ENGINEERING CO.
149 Broadway, New York
Works - CARTERET, N.J., NEWBURGH, N.Y. 18



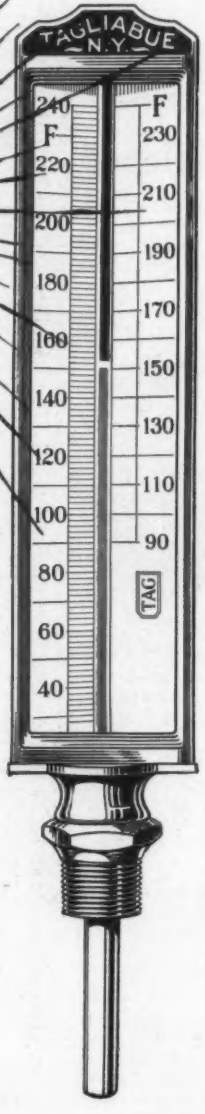
Wheeler Partial Condensers



Wheeler Residual Heat Exchangers

At Last! Readability Combined with Precision!

The RED LINE MAKES IT EASILY READ



THE BRIGHT RED STREAK of TAG-Hespe Glass makes accurate mercury thermometers as easily *readable* as spirit-filled thermometers. Oil men know the superior qualities of mercury thermometers—especially those made by TAG. But before the introduction of TAG-Hespe Glass the reading of accurate fine-bore mercury thermometers was an eye-straining job. For that reason the oil industry is enthusiastically endorsing this *exclusive* TAG offering, and applying it wherever thermometers are needed . . . . Vapor lines, crude stills, re-run stills, tar stills, pressure stills, cracking coils, condensate lines and other distillation applications . . . throughout the power plant, the filter plant, the wax plant, the gasoline recovery plant, the natural gasoline plant, etc., etc.

A suggestion—Send us a list of your thermometers, and let us quote on replacing ordinary glass with TAG-Hespe Glass. The make does not matter, so long as they are of the industrial type universally used throughout the oil industry. *Now* is a good time to write, so that the work may be done when most convenient.

And Here is the Very Simple "Secret" of it:

A—White Glass B—Red Glass
C—Mercury Bore D—Lens Front

THIS IS A CROSS-SECTION of TAG-Hespe thermometer glass, enlarged several diameters. Bright red glass (B) forms the back of the mercury bore (C). There is nothing between the mercury and the red glass. The lens front (D) magnifies both the mercury column and the red glass. The vivid broad streak of red *shows only above the mercury* when you take the reading. It thus provides effective contrast and makes it very easy to see the exact point where the mercury column ends—it makes it easy to read the exact temperature *at a glance.* No more eyestrain, no more guess-work.

This unique construction is the last word in thermometer glass. It is correct optically. It is scientifically *right.* It cannot be improved upon. It cannot be imitated. Beware, therefore, of worthless substitutes now being forced on the market. Only in the genuine is maximum accuracy combined with maximum visibility. Remember the name and the above cross-section, with the red glass forming the back of the mercury bore.

TAG Industrial Thermometers for Oil Industry Applications, embodying the TAG-Hespe feature, cost only a trifle more than ordinary thermometers.

C. J. TAGLIABUE MFG. CO.

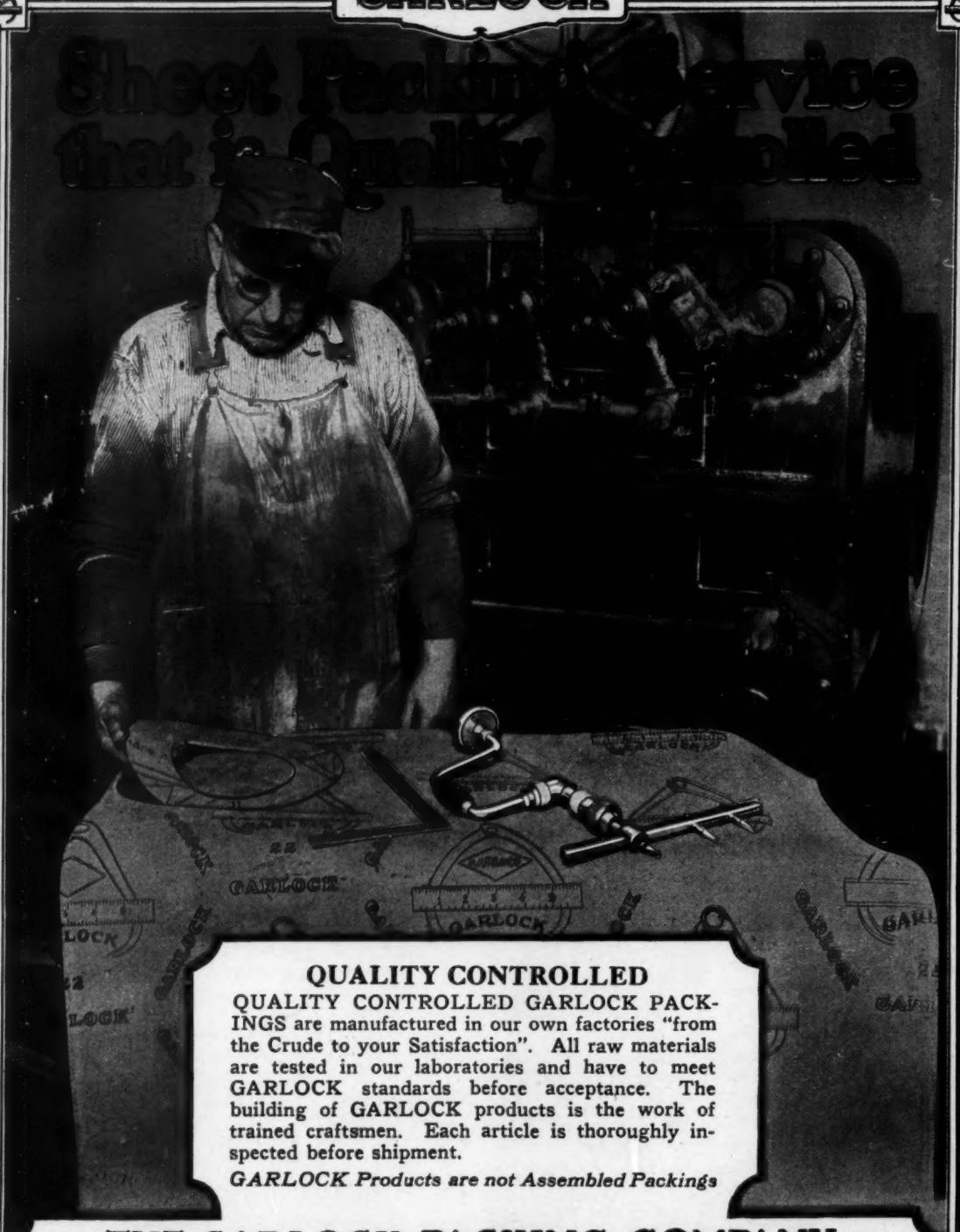
18 TO 88 THIRTY-THIRD ST., BROOKLYN, N.Y.

Insist on Mercury Thermometers with the TAG-Hespe RED Reading Column

SINCE 1769

Tell them where you saw the ad

GARLOCK



QUALITY CONTROLLED

QUALITY CONTROLLED GARLOCK PACKINGS are manufactured in our own factories "from the Crude to your Satisfaction". All raw materials are tested in our laboratories and have to meet GARLOCK standards before acceptance. The building of GARLOCK products is the work of trained craftsmen. Each article is thoroughly inspected before shipment.

GARLOCK Products are not Assembled Packings

THE GARLOCK PACKING COMPANY

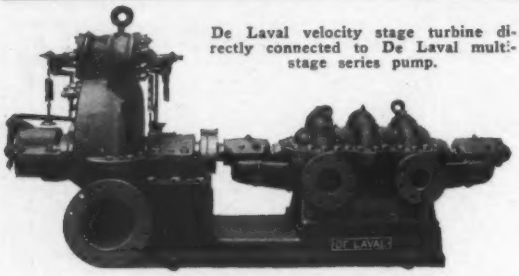
Manufacturers of
Asbestos Rubber GARLOCK PACKINGS Metal Fibrous

PALMYRA, New York., U. S. A.

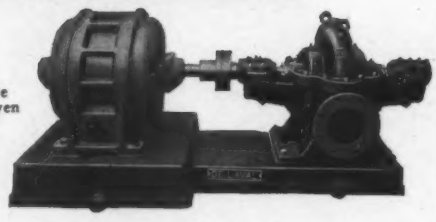
CANADIAN GENERAL OFFICES AND FACTORY. HAMILTON ONT

SALES OFFICES AND WAREHOUSES IN ALL PRINCIPAL INDUSTRIAL CENTERS

Tell them where you saw the ad



De Laval velocity stage turbine directly connected to De Laval multi-stage series pump.



Medium size De Laval motor driven pump.

De Laval
Centrifugal Pumps

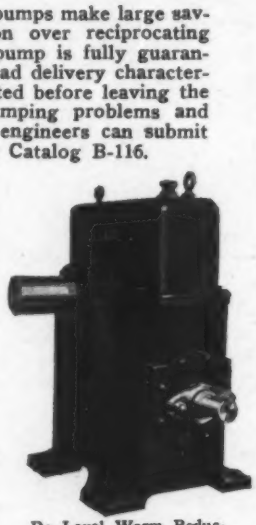
All Liquids in All Quantities and Against All Heads—Belt, Motor or Steam Turbine Drive

De Laval Centrifugal Pumps are especially designed for reliability and durability, being made from the highest class materials and manufactured on a limit gage, interchangeable basis, so that renewal parts ordered from the factory by number can be inserted by unskilled men without having to be fitted.

De Laval turbine driven pumps make large savings in steam consumption over reciprocating pumps. Every De Laval pump is fully guaranteed as to efficiency and head delivery characteristic, and is thoroughly tested before leaving the works. Describe your pumping problems and requirements, so that our engineers can submit recommendations. Ask for Catalog B-116.

The DeLaval Worm Reduction Gear

is a superior speed reducer used in individual motor drives of slow and moderate speed machinery. It is silent, self-contained, compact, self-oiling, efficient and requires practically no attention further than to see that the oil well is kept filled. Ask for Catalog B-116.



De Laval Worm Reduction Gear for motor drives.

De Laval
Steam Turbine Co., Trenton, N.J.

Local Offices: Atlanta, Boston, Charlotte, Chicago, Cleveland, Dallas, Denver, Duluth, Helena, Houston, Indianapolis, Kansas City, Los Angeles, Montreal, New York, New Orleans, Philadelphia, Pittsburgh, Portland, Ore., Salt Lake City, San Francisco, Seattle, Toronto, Vancouver. 438

Manufacturers of Steam Turbines, Centrifugal Pumps, Centrifugal Blowers and Compressors, Double Helical Speed Reducing Gears, Worm Gears, Hydraulic Turbines, Flexible Couplings and Special Centrifugal Machinery

2131 Transportation Bldg., Chicago, Ill.
Columbian Steel Tank Co, Kansas City, Mo.
Cypress Tank Co., Shreveport, La.
Black, Sivalls & Bryson, Bartlesville, Okla.
Connery & Co. Inc., Philadelphia, Pa.
Davis & Farnum Engineering Works, Inc., Waltham, Mass.
John Dollinger Jr., Inc., Beaumont, Texas
Gantz Tank Co., Sapulpa, Okla.
Graver Corp, 414 Todd Ave., East Chicago, Ind. See pages 3-33.
Hendrick Mfg. Co., Carbondale, Pa.
Kansas City Structural Steel Co., Kansas City, Mo.
Kaw Boiler Works Co., Kansas City, Mo.
Lancaster Iron Works, Inc., Lancaster, Pa.
E. Leonard & Sons, London, Can.
Llewellyn Iron Works, Los Angeles, Calif.
Maloney Tank Mfg. Co., Tulsa, Okla.
Morrison Bros., Dubuque, Iowa
Murray Iron Works Co., Burlington, Iowa
M. & V. Tank Co., Wichita Falls, Texas
North American Car Co., 327 S. LaSalle St., Chicago, Ill. See page 96.
Wm. W. Nugent & Co., 410-12 N. Hermitage Ave., Chicago, Ill.
John O'Brien Boiler Works Co., 11th to 13th Mullanphy to Howard St., St. Louis, Mo.
Parkersburg Rig & Reel Co., Parkersburg, W. Va.
The Petroleum Iron Works Co. of Ohio, Sharon, Pa.
Pittsburgh-Des Moines Steel Co., Curry Bldg., Pittsburgh, Pa.
The Standard Boiler & Plate Iron Co., Niles, Ohio
Steel Tank & Products Corp., 26 N. Jefferson St., Chicago, Ill.
United Iron Works, Kansas City, Mo. See page 95.

TANKS, Acid
Downington Iron Works, Downington, Pa.
Pioneer Tank & Boiler Co., Tulsa, Okla. See page 83.
Pittsburgh-Des Moines Steel Co., Curry Bldg., Pittsburgh, Pa.

TANKS, Accumulators
Kansas City Structural Steel Co., Kansas City, Kansas

TANKS, Agitators
McNamara Brothers Co., Westport, Baltimore, Md.
Pioneer Tank & Boiler Co., Tulsa, Okla. See page 83

TANKS, Compression
American Gas Construction Co., Newton, Iowa
Wm. B. Scaife & Sons Co., Oakmont, Pa.

TANKS, Run Down
Kansas City Structural Steel Co., Kansas City, Kansas
United Iron Works, Inc., Kansas City, Mo. See page 95.

TANKS, Pressure
Downington Iron Works, Downington, Pa.
Pioneer Tank & Boiler Co., Tulsa, Okla. See page 83.

TANKS, Storage
Hammond Iron Works, Warren, Pa.
Kansas City Structural Steel Co., Kansas City, Kansas
L. O. Koven & Brothers, Inc., 154 Ogden Ave., Jersey City, N. J.
McNamara Brothers Co., Westport, Baltimore, Md.
Pioneer Tank & Boiler Co., Tulsa Okla. See page 83.
Pittsburgh-Des Moines Steel Co., Curry Bldg., Pittsburgh, Pa.
Prospect Boiler Co., New Brunswick, N. J.
Richmond Engineering Co., P. O. Box 514, Richmond, Va.
Standard Tank Car Co., St. Louis, Mo.
Steel Tank and Products Corp., 26 N. Jefferson St., Chicago, Ill.
Tampa Shipbuilding & Engineering Co., Tampa, Fla.
Titusville Iron Works, Titusville, Pa. See page 16.
M. H. Treadwell Co. of Ill., 208 S. LaSalle St., Chicago, Ill.
United Iron Works, Inc., Kansas City, Mo. See page 95.

TAPES, Measuring
The Lufkin Rule Co., Saginaw, Mich.
The L. S. Starrett Co., Althol, Mass.

TAPS
Greenfield Tap & Die Corp., Greenfield, Mass.
Landis Machine Co., Waynesboro, Pa.

TESTERS (See Scientific Instruments)

THERMO-COUPLES
Brown Instrument Co., Wayne and Windrim Ave., Philadelhpia, Pa. See page 82
Illinois Testing Laboratories, Inc., 141 W. Austin Ave., Chicago, Ill.
Leeds & Northrup Co., Philadelphia, Pa.
Taylor Instrument Co., Rochester, N. Y. See page 90.

THERMOGRAPHS
Taylor Instrument Co., Rochester, N. Y. See page 90.

THERMOMETERS
American Schaeffer & Budenberg Corp., Berry and S. 5th Sts., Brooklyn, N. Y. See page 64.
James Berg Mfg. Co., 3707 12th Ave., Brooklyn, N. Y.
Bristol Co., Waterbury, Conn.
The Brown Instrument Co., Philadelphia, Pa. See page 82.
The Denver Fire Clay Co., P. O. Box 1107, Denver, Colo.
Eimer & Amend, Third Ave. 18 to 19 St., New York City
Fort Worth Laboratories, 828½ Monroe St., Fort Worth, Texas. See page 84.
The Foxboro Co. Inc., Foxboro, Mass.
Henry J. Green, 1191 Bedford Ave., Brooklyn, N. Y.
Griebel Instrument Co., Carbondale, Pa.
The Palmer Co., 408-10-12 E. Court St., Cincinnati, Ohio
The Refinery Supply Co., 4th and Detroit Sts., Tulsa, Okla. See page 86.
Standard Thermometer Co., Boston, 19, Mass.
Tagliabue, C. J., Mfg. Co., 18-88 33rd St., Brooklyn, N. Y. See page 56.
Taylor Instrument Co., Rochester, N. Y. See page 90.
Edward Soph, 124 W. 3rd St., Tulsa, Okla.
Carl H. Wagner, 1944 N. Albany Ave., Chicago, Ill.

THERMOSTATS
American Thermostat Co., Newark, N. J.
Klipfel Mfg. Co., Chicago, Ill.
Standard Thermometer Co., Boston 19, Mass.
C. J. Tagliabue Mfg. Co., 18 to 88 33rd St., Brooklyn, N. Y. See page 56.
Taylor Instrument Co., Rochester, N. Y. See page 90.

THIEVES, Oil
Barnhart-Davis Co., Warren, Pa.

TILE, Boiler
The Denver Fire Clay Co., P. O Box 1107, Denver, Colo.

TILE, Fire Clay
The Denver Fire Clay Co., P. O. Box 1107, Denver, Colo.

TONGS, Rivet
Sculley Steel & Iron Co., Chicago, Ill.

TOOLS, Machine
The Cincinnati Planer Co., Cincinnati, Ohio

The Lufkin Rule Co., Saginaw, Mich.
William Sellers & Co., Inc., Philadelphia, Pa.
The L. S. Starrett Co., Althol, Mass.

TOOLS, Scaling
The Dallett Co., 165-189 W. Clearfield St., Philadelphia, Pa.

TOOLS, Planing
Underwood, H. B., Corp., 1015-1025 Hamilton St., Philadelphia, Pa.

TOOLS, Pneumatic
Cleveland Pneumatic Tool Co., Cleveland, Ohio
Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill.
Ingersoll-Rand Co., 11 Broadway, New York City
May Machinery Co., Second Natl. Bank Bldg., Houston, Texas
The Roto Co., Hartford, Conn. See page 92.

TORCHES, Blow
Hauck Mfg. Co., 126-134 10th St., Brooklyn, N. Y.

TORCHES, Cutting
The Bastian-Blessing Co., 240-258 E. Ontario St., Chicago, Ill.
Economy Welding Machine Co., 5-9 W. 20th St., Kansas City, Mo.

TOWERS
E. B. Badger & Sons Co., Boston 14, Mass.
C. F. Braun & Co., Alhambra, Cal. See pages 52-53.
Kansas City Structural Steel Co., Kansas City, Kansas
Southwestern Engineering Corp., 1221 Hollingsworth Bldg., Los Angeles, Calif. See page 49.
Southwestern Engineering Co. Inc., 90 West Street, New York City
The Standard Boiler & Plate Iron Co., Niles, Ohio. See page 49
United Iron Works, Inc., Kansas City, Mo. See page 95.

TOWERS, Bubble
E. B. Badger & Sons Co., Boston, 14, Mass.
John Dollinger Jr. Inc., Beaumont, Texas
Southwestern Engineering Corp., 1221 Hollingsworth Bldg., Los Angeles, Calif. See page 49.
Southwestern Engineering Co., Inc., 90 West St., New York, City, See page 49.

TOWERS, Cascade
Southwestern Engineering Co. Inc., 90 West St., New York City. See page 49.
Southwestern Engineering Corp., 1221 Hollingsworth Bldg., Los Angeles, Calif. See page 49.

TOWERS, Cooling
C. F. Braun & Co., Alhambra, Cal. See pages 52-53.
Edwin Burhorn Co., 25 W. Broadway, New York City
The Cooling Tower Co. Inc., 15 John St., New York City
Downington Iron Works, Downington, Pa.
Fluor Construction Co., Los Angeles, Calif. See page 97.
Newton Process Mfg. Co., Fullerton, Calif.
Southwestern Engineering Corp., 1221 Hollingsworth Bldg., Los Angeles, Calif. See page 49.
Walsh & Weidner Boiler Co., Chattanooga, Tenn.
C. H. Wheeler Mfg. Co., Philadelphia, Pa.
Wheeler Condenser & Engineering Co., Carteret, N. J. See page 55.

TOWERS, Vaporizing
Kansas City Structural Steel Co., Kansas City, Kansas

TRANSFORMERS, Electrical
General Electric Co., Schenectady, N. Y.

TRANSFORMERS, Speed
The Hill Clutch, Machine & Foundry Co., Cleveland, Ohio

TRANSMISSION, Equipment
Chain Belt Co., Milwaukee, Wis.
Dick, R. & J. Co. Inc., Passaic, N. J.
The Hill Clutch, Machine & Foundry Co., N. E. Cor. Breakwater Ave. and W. 65th St., Cleveland, Ohio
Morse Chain Co., Ithaca, N. Y.

TRAPS, Steam
American Blower Co., Detroit, Mich.
American Schaeffer & Budenberg Corp., Berry & 5th Sts., Brooklyn, N. Y. See page 64.
The V. D. Anderson Co., 1935 W. 96th St., Cleveland, Ohio
Armstrong Machine Works, Three Rivers, Mich.
F. A. Burrows Mfg. Co., York, Penn.
Johns-Manville, Inc., Madison Ave., at 41st St., New York City
Kitts Mfg. Co., 19 W. Seneca St., Oswego, N. Y.
Morehead Mfg. Co., Grand River Ave., Detroit, Mich.
Edward Soph, 124 W. 3rd St., Tulsa, Okla.
The Williams Gauge Co., Pittsburgh, Pa.
The D. T. Williams Valve Co., Cincinnati, Ohio
Fisher Governor Co., Marshalltown, Iowa. See page 12.
Klipfel Mfg. Co., Chicago, Ill.

TROUGHS AND CONVEYORS Filter Press
Bethlehem Shipbuilding Corp. Ltd., Bethlehem, Pa.

TUBES, Boiler
Bethlehem Steel Co., Bethlehem, Pa.
Casey-Hedges Co., Chattanooga, Tenn.
Harrisburg Pipe & Pipe Bending Co. of Texas, Houston, Texas
Monangahela Tube Co., Pittsburgh, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Ryerson, Joseph T., & Son, 16th and Rockwell Sts., Chicago, Ill.
South Chester Tube Co., Chester, Pa.
Pittsburgh Steel Products Co., Pittsburgh, Pa.

TUBES, Boiler Charcoal Iron
Casey-Hedges Co., Chattanooga, Tenn.
Reading Iron Co., Reading, Pa.
Ryerson, Joseph T., & Son, 16th and Rockwell Sts., Chicago, Ill.
Tyler Tube & Pipe Co., Washington, Pa.

TUBES, Condenser
U. T. Hungerford Brass & Copper Co., Lafayette, White and Franklin Sts., New York City
Scovill Mfg. Co., Waterbury, Conn
Wheeler Condenser & Engineering Co., 149 Broadway, New York, N. Y. See page 55.

TUBES, Still
Harrisburg Pipe & Pipe Bending Co. of Texas, Houston, Texas

TUBING, Gauge
Wagner, Carl H., 1944 N. Albany Ave., Chicago, Ill.

TUBING, Rubber
Fort Worth Laboratories, 828½ Monroe St., Fort Worth, Texas. See page 84.

TURBINES
Elliott Co., Jeannette, Pa.
The Pyle National Co., 1334 N. Kostner Ave., Chicago, Ill.
Southern Engine & Pump Co., 615 Washington Ave., Houston, Tex.

TURBINES, Steam
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
De Laval Steam Turbine Co., Trenton, N. J. See page 58
General Electric Co., Schenectady, N. Y.
Kerr Turbine Co., Wellsville, N. Y.
Power Turbo-Blower Co., 45th St. and Madison Ave., New York, N. Y.
The Terry Steam Turbine Co., Hartford, Conn.

VALVES
Cash, A. W., Co., P. O. Box 35, Decatur, Ill.
Chapman Valve Mfg. Co., Indian Orchard, Mass.
Driver-Harris Co., Harrison, N. J
Fisher Governor Co., Marshalltown, Iowa. See page 12.
John Forest & Sons, Box 54, Bayonne, N. J.
Foster Engineering Co., 109-117 Monroe St., Newark, N. J.
The Griscom-Russell Co., 94 West St., New York City. See page 9.
Harrisburg Pipe & Pipe Bending Co. of Texas, Houston, Texas
D A. Hinman & Co., Sandwich, Ill.
The Hydraulic Press Mfg. Co., Mount Gilead, Ohio
Jenkins Brothers, 80 White St., New York City
Klipfel Mfg. Co., Chicago, Ill.
Limbert, George B. & Co., 570 Fulton St., Chicago, Ill.
Locke Regulator Co., Salem, Mass
Ludlow Valve Mfg. Co., Troy, New York
Merrell Co., Houston, Texas
The Lunkenheimer Co., Cincinnati, Ohio. See page 14.
Manning, Maxwell & Moore, Inc., 100 E. 42nd St., New York City
Schutte & Koerting Co., Philadelphia, Pa. See page 39
Edward Soph, 124 W. 3rd St., Tulsa, Okla.
United Iron Works, Inc., Kansas City, Mo. See page 95.
Victory Mfg. Co., Niles, Calif.
Western Fire Engineers, 223 Higgins Bldg., Los Angeles, Calif.

VALVES, Acid
Sculley Steel & Iron Co., Chicago, Ill.
Edward Soph, 124 W. 3rd St., Tulsa, Okla.
Schutte & Koerting Co., 1165 Thompson St., Philadelphia, Pa. See page 39.

VALVES, Ammonia
Kelly & Jones Co., Greensburg, Pa.
Merrill Co., 121 Second St., San Francisco, Calif.
Reading Steel Casting Co., Bridgeport, Conn.
Vilter Mfg. Co., 1194-96 Clinton St., Milwaukee, Wis. See page 95.
Walworth Mfg. Co., 142 High St., Boston, Mass.
York Mfg. Co. York, Pa.

VALVES, Back Pressure
Paine, H. A., Houston, Texas

VALVES, Balanced
Chaplin-Fulton Co., 28 Penn Ave., Pittsburgh, Pa. See page 94.
Crane Co., 836 So. Michigan Ave., Chicago, Ill.
Davis, G. M., Regulator Co., 439 Milwaukee Ave., Chicago, Ill.
Defender Automatic Regulator Co., St. Louis, Mo.
Fisher Governor Co., Marshalltown, Iowa. See page 12.
Jenkins Bros., 80 White St., New York, N. Y.
Locke Regulator Co., 76 North St., Salem, Mass.
Mason Regulator Co., Boston, Mass.
Pittsburgh Valve, Foundry & Construction Co., P. O. Box 1016, Pittsburgh, Pa.
Walworth Mfg. Co., 142 High St., Boston, Mass.

VALVES, Ball Drip
Central Automatic Sprinkler Co., 5146-47 Delancey St., Philadelphia, Pa.

VALVES, Blow-off
Buckeye Iron & Brass Works, 310 E. Third St., Dayton, Ohio
Cadman, A. W., Mfg. Co., 2814 Smallman St., Pittsburgh, Pa.
Crane Co., 836 So. Michigan Ave., Chicago, Ill.
Elliott Co., Jeannette, Pa.
Homestead Valve Mfg. Co., 138 6th St., Homestead, Pa.
Jarecki Mfg. Co., Erie, Pa.
Jenkins Bros., 80 White St., New York, N. Y.
Kelly & Jones Co., Greensburg, Pa.
Lunkenheimer Co., Cincinnati, O. See page 14.
Merrill Co., 121 Second St., San Francisco, Calif.
Ohio Injector Co., So. Main St., Wadworth, Ohio
Pittsburgh Valve, Foundry & Construction Co., P. O. Box 1016, Pittsburgh, Pa.
Powell, Wm. Co., Cincinnati, Ohio
Sculley Steel & Iron Co., Chicago, Ill.
Walworth Mfg. Co., 142 High St., Boston, Mass.
Williams, D. T., Valve Co., Spring Grove Ave. and Township Sts., Cincinnati, Ohio

VALVES, By-Pass
C. F. Braun & Co., Alhambra, Cal. See pages 52-53.
Lunkenheimer Co., Cincinnati, O. See page 14.
Northern Equipment Co., Erie, Pa.

VALVES, Check
Barret, Haentjens & Co., Hazelton, Pa.
Buckeye Iron & Brass Works, 310 E. Third St., Dayton, Ohio
The Chapman Valve Mfg. Co., 203 Hampshire St., Indian Orchard, Mass.
Crane Co., 836 So. Michigan Ave., Chicago, Ill.
Davis, G. M., Regulator Co., 439 Milwaukee Ave., Chicago, Ill.
Fairbanks Co., 416 Broome St., New York, N. Y.
Farnsworth Co., Norristown, Pa.
Fisher Governor Co., Marshalltown, Iowa. See page 12.
Henry Vogt Machine Co., Louisville, Ky.
Jarecki Mfg. Co., Erie, Pa.
Jenkins Bros., 80 White St, New York, N. Y.
Kelly & Jones Co., Greensburg, Pa.
Lunkenheimer Co, Cincinnati, O. See page 14.
National Supply Cos., Toledo, O.
Pittsburgh Valve, Foundry & Construction Co., P. O. Box 1016, Pittsburgh, Pa.
Powell, Wm., Co., Cincinnati, O.
Reading Steel Casting Co. Inc., Bridgeport, Conn.
Trill Indicator Co., Corry, Pa.
Walworth Mfg. Co., 142 High St., Boston, Mass.
Williams, D. T., Valve Co., Spring Grove Ave. and Township Sts., Cincinnati, Ohio

VALVES, Check Swing
The D. T. Williams Valve Co., Cincinnati, Ohio

VALVES, Combined Back Pressure and Relief
Chaplin-Fulton Co., 28 Penn Ave., Pittsburgh, Pa. See page 94.
Davis, G. M., Regulator Co., 439 Milwaukee Ave., Chicago, Ill.
Fisher Governor Co., Marshalltown, Iowa. See page 12.

VALVES, Control
The Brown Instrument Co., Philadelphia, Pa. See page 82.
National Airoil Burner Co., 9th and Thompson Sts., Philadelphia, Pa.

VALVES, Electrically Operated
Chapman Valve Mfg. Co., 203 Hampshire St., Indian Orchard, Mass.
Ludlow Valve Mfg. Co., Troy, N. Y.
Pittsburgh Valve, Foundry & Construction Co., P. O. Box 1016, Pittsburgh, Pa.

VALVES, Float
Defender Automatic Regulator Co., St. Louis, Mo.
Klipfel Mfg. Co., Chicago, Ill.
Lewis Steam Specialty & Valve Co., 5145 Delancey St., Philadelphia, Pa.
Northern Equipment Co., Erie, Pa.
Watts Regulator Co., 250-252 Lowell St., Lawrence, Mass.

VALVES, Gas
The P. H. & F. M. Roots Co., Chicago, Ill. See inside front cover.

VALVES, Gasoline Relief
The Chaplin-Fulton Mfg. Co., 28-34 Penn Ave., Pittsburgh, Pa. See page 94.

VALVES, Gate
Chapman Valve Mfg. Co., 203 Hampshire St., Indian Orchard, Mass.
Crane Co., 836 So. Michigan Ave., Chicago, Ill.
Darling Valve & Mfg. Co., Williamsport, Pa.
Fairbanks Co., 416 Broome St., New York, N. Y.
Illinois Malleable Iron Co., 1801-1825 Diversey Parkway, Chicago, Ill.
Jarecki Mfg. Co., Erie, Pa.
Jenkins Bros., 80 White St., New York, N. Y.
Kelly & Jones Co., Greensburg, Pa.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Ludlow Valve Mfg. Co., Troy, N. Y.
Lunkenheimer Co., Cincinnati, O. See page 14.
Maintenance Engineering Corp., 614 Second Natl Bank Bldg., Houston, Texas. See page 95.
McDonald Mfg. Co., A. Y., Dubuque, Iowa. See back cover.
National Supply Cos., Toledo, O.
Ohio Injector Co., So. Main St., Wadsworth, Ohio
Pittsburgh Valve, Foundry & Construction Co., P. O. Box 1016, Pittsburgh, Pa.
Powell, Wm. Co., Cincinnati, O.
Reading Steel Casting Co. Inc., Bridgeport, Conn.
Schutte & Koerting, 1165 Thompson St., Philadelphia, Pa. See page 39.
Walworth Mfg. Co., 142 High St., Boston, Mass.
Williams, D. T., Valve Co., Spring Grove Ave. and Township Sts., Cincinnati, Ohio

VALVES, Globe
Homestead Valve Mfg. Co., 138 6th Ave., Homestead, Pa.
New Bedford Valve Mfg. Co., 42 Front St., New Bedford, Mass.
The D. T. Williams Valve Co., Cincinnati, Ohio

VALVES, Globe, Angle and Cross
Buckeye Iron & Brass Works, 310 E. Third St., Dayton, Ohio
Clow, James B., & Sons, 534 So. Franklin St., Chicago, Ill.
Crane Co., 836 So. Michigan Ave., Chicago, Ill.
Detroit Lubricator Co., 5938 Trumbull Ave., Detroit, Mich.
Fairbanks Co., 416 Broome St., New York, N. Y.
Fulton Co., Knoxville, Tenn.
Jarecki Mfg. Co., Erie, Pa.
Jenkins Bros., 80 White St., New York, N. Y.
Kelly & Jones Co., Greensburg, Pa.
Lunkenheimer Co., Cincinnati, O. See page 14.
Morrison Bros., Dubuque, Iowa
National Supply Cos., Toledo, O.
Ohio Injector Co., So. Main St., Wadsworth, Ohio
Pittsburgh Valve & Fitting Co., Barberton, Ohio
Pittsburgh Valve, Foundry & Construction Co., P. O. Box 1016, Pittsburgh, Pa.
Powell, Wm., Co., 2525 Spring Grove Ave., Cincinnati, Ohio
Walworth Mfg. Co., 142 High St., Boston, Mass.
Williams, D. T., Valve Co., Spring Grove Ave. and Township St., Cincinnati, Ohio

VALVES, Hose
Chapman Valve Mfg. Co., Indian Orchard, Mass.
Crane Co., 836 So. Michigan Ave., Chicago, Ill.
Darling Valve & Mfg. Co., Williamsport, Pa.
Jenkins Bros., 80 White St., New York, N. Y.
Kelly & Jones Co., Greensburg, Pa.
Powell, Wm., Co., Cincinnati, O.
Walworth Mfg. Co., 142 High St., Boston, Mass.
Williams, D. T., Valve Co., Spring Grove Ave. and Township St., Cincinnati, Ohio

VALVES, Hot Oil and Tar
Homestead Valve Mfg. Co., 138 6th Ave., Homestead, Pa.

VALVES, Lead Lined
United Lead Co., 111 Broadway, New York City

VALVES, Lever
Klipfel Mfg. Co., Chicago, Ill.

VALVES, Non-Return
Chapman Valve Mfg. Co., Indian Orchard, Mass.
Crane Co., 836 So. Michigan Ave., Chicago, Ill.
Davis, G. M., Regulator Co., 439 Milwaukee Ave., Chicago, Ill.
Jarecki Mfg. Co., Erie, Pa.
Jenkins Bros., 80 White St., New York, N. Y.
Kelly & Jones Co., Greensburg, Pa.
Lunkenheimer Co., Cincinnati, O. See page 14.
Pittsburgh Valve, Foundry & Construction Co., P. O. Box 1016, Pittsburgh, Pa.
Powell, Wm. Co., Cincinnati, O.
Walworth Mfg. Co., 142 High St., Boston, Mass.
Williams, D. T., Valve Co., Spring Grove Ave. and Township St., Cincinnati, Ohio

VALVES, Oil Control
National Airoil Burner Co., 9th & Thompson Sts., Philadelphia, Pa.

VALVES, Plate
Mesta Machine Co., Pittsburgh,

VALVES, Plug
Chapman Valve Mfg. Co., Indian Orchard, Mass.
Fairbanks Co., 416 Broome St., New York, N. Y.
Kelly & Jones Co., Greensburg, Pa.
Merco Nordstrom Valve Co., 121 Second St., San Francisco, Cal.
Merrill Co., 121 Second St., San Francisco, Calif.
Pittsburgh Valve, Foundry & Construction Co., P. O. Box 1016, Pittsburgh, Pa.
Edward Soph, 124 W. 3rd St., Tulsa, Okla.
Walworth Mfg. Co., 142 High St., Boston, Mass.

VALVES, Pump
Brandt, Randolph, 66 Cortlandt St., New York, N. Y.
The Diamond Rubber Co., Akron Ohio
Edison Packing & Sales Co., 234 State St., Boston, Mass.
Jenkins Bros., 80 White St., New York City.
Kelly & Jones Co., Greensburg, Pa.
Lake Erie Mfg. Co., Inc., 192-198 Chicago St., Buffalo, N. Y.
New York Belting & Packing Co., 91-93 Chambers St., New York, N. Y.
Powell, Wm., Co., Cincinnati, Ohio
U. S. Indestructible Gasket Co., 829 E. 15th St., Brooklyn, N. Y.
Voorhees Rubber Mfg. Co., 18-50 Bostwick Ave., Jersey City, N. J.
The Williams Gauge Co., Pittsburgh, Pa.

VALVE, Reducing
The Chaplin-Fulton Mfg. Co., 28-34 Penn Ave., Pittsburgh, Pa. See page 94.
Julian d'Este Co., 26 Canal St., Boston, Mass.
Fisher Governor Co., Marshalltown, Iowa
Kitts Mfg. Co., Oswego, N. Y. See Page 12.
Northern Equipment Co., Erie, Pa.
Schutte & Koerting Co., 1165 Thompson St., Philadelphia, Pa. See page 39.
The C. E. Squires Co., E. 40th St. & Kelley Ave., Cleveland, Ohio
Watts Regulator Co., 250-252 Lowell St., Lawrence, Mass.
Wilgus Mfg. Co., 1722 E. 16th St., Los Angeles, Calif.

VALVES, Regulating
Chaplin-Fulton Co., 28 Penn Ave., Pittsburgh, Pa. See page 94.
Cochrane Corp., 3130 No. 17th St., Philadelphia, Pa.
Crane Co., 836 So. Michigan Ave., Chicago, Ill.
Davis, G. M., Regulator Co., 439 Milwaukee Ave., Chicago, Ill.
Defender Automatic Regulator Co., St. Louis, Mo.
Fisher Governor Co., Marshalltown, Iowa. See page 12.
Fulton Company, Knoxville, Tenn.
Jenkins Bros., 80 White St., New York, N. Y.
Kelly & Jones Co., Greensburg, Pa.
Northern Equipment Co., Erie, Pa.
Powers Regulator Co., 2776 Greenview Ave., Chicago, Ill.
The C. E. Squires Co., E. 40th St. & Kelley Ave., Cleveland, O.
Walworth Mfg Co., 142 High St., Boston, Mass.

VALVES, Relief
J. E. Lonergan Co., 211-213 Race St., Philadelphia, Pa.
Neptune Meter Co., 50 E. 42nd. St., New York City.
Northern Equipment Co., Erie, Pa.
Paine, H. A., Houston, Texas
The P. H. & F. M. Roots Co., Chicago, Ill. See inside front cover.
Wilgus Mfg. Co., 1722 E. 16th St., Los Angeles, Calif.

VALVES, Rubber
Garlock Packing Co., Palmyra, New York. See page 57.
Voorhees Rubber Mfg. Co., 20 to 56 Bostwick Ave., Jersey City, New Jersey

VALVES, Safety
American Schaefier & Budenberg Corp., Berry & 5th Sts., Brooklyn, N. Y. See page 64.
Buckeye Iron & Brass Works, 310 E. Third St., Dayton, Ohio
Crane Co., 836 So. Michigan St., Chicago, Ill.
Jarecki Mfg. Co., Erie, Pa.
Jenkins Bros., 80 White St., New York, N. Y.
Kelly & Jones Co., Greensburg, Pa.
Lunkenheimer Co., Cincinnati, O. See page 14.
The Oil Conservation Engineering Co., Cleveland, Ohio
Powell, Wm., Co., Cincinnati, O.

VALVES, Pop Safety
Crane Co., 836 So. Michigan Ave., Chicago, Ill.
Detroit Lubricator Co., 5938 Trumbull Ave., Detroit, Mich.
Jarecki Mfg. Co., Erie, Pa.
J. E. Lonergan Co., 213-215 Race St, Philadelphia, Pa.
Lunkenheimer Co., Cincinnati, O. See page 14.
Powell, Wm., Co., Cincinnati, O.
Walworth Mfg. Co., 142 High St., Boston, Mass.

VALVES, Sight Feed
Wm. W. Nugent & Co., Inc., 410-412 N. Hermitage Ave., Chicago, Illinois

VALVES, Solenoid Operated
The Cutler-Hammer Mfg. Co., Milwaukee, Wis.

VALVES, Super-Heated Steam, Steel
Chapman Valve Mfg. Co., Indian Orchard, Mass.
Crane Co., 836 So. Michigan Ave., Chicago, Ill.
Darling Valve & Mfg. Co., Williamsport, Pa.
Jenkins Bros., 80 White St., New York, N. Y.
Kelly & Jones Co., Greensburg, Pa.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Lunkenheimer Co., Cincinnati, O. See page 14.
Merrill Co., 121 Second St., San Francisco, Calif.
Powell, Wm., Co., Cincinnati, Ohio
Reading Steel Casting Co., Inc., Bridgeport, Conn.
Henry Vogt Machine Co., Louisville, Ky. See page 34.
Walworth Mfg. Co., 142 High St., Boston, Mass.

VALVES, Wax Press Opening
Homestead Valve Mfg. Co., 138 6th Ave., Homestead, Pa.

VAPORIZERS
E. B. Badger & Sons Co., Boston, Mass.

VAPOR RECOVER SYSTEMS
United Iron Works, Inc., Kansas City, Mo. See page 95.

VENTILATORS
Allen Air Turbine Ventilator Co., 8th & Porter Sts., Detroit, Mich.
Dee, William V., Co., 729 Union Ave., Bridgeport, Conn.
Paine, H. A., Houston, Texas

VENTILATORS, Roof
Burt Mfg. Co., Akron, Ohio
Gilbert, Walter B., & Co., West York Ave., & W. M. R. R., York, Pa.
H H. Robertson Co., First Nat. Bank Bldg., Pittsburgh, Pa.
Swartwout Co., P. O. Box 61 East, Cleveland, Ohio
Van Noorden, E., Co., 102 Magazine St., Roxbury, Mass.

VENTILATORS, Window
Gilbert, Walter B., & Co., West York Ave. & W. M. R. R., York, Pa.

VISCOSIMETERS
Central Scientific Co., 460 E. Ohio St., Chicago, Ill.
Eimer & Amend, Third Ave., 18 to 19 St., New York City
The Emil Greiner Co., 55 Fulton St., New York City
Fort Worth Laboratories, 828½ Monroe St., Fort Worth, Texas See page 84.
Tagliabue, C. J., Mfg. Co., 18-88 33rd St., Brooklyn, N. Y. See page 56.
Taylor Instrument Co., Rochester, N. Y. See page 50.

VISES
The Armstrong Mfg. Co., Bridgeport, Conn.
Bonney Forge & Tool Works, Allentown, Pa.
Spencer Regulator Co., Salem, Mass.

VOLTOMETERS
Illinois Testing Laboratories, Inc., 14. W. Austin Ave., Chicago, Ill.

VENT EQUIPMENT
McDonald Mfg. Co., A. Y., Dubuque, Iowa. Back cover.
The Oil Conservation Engineering Co., Cleevland, O. See page 10.
Westcott & Greis, Tulsa, Okla. See page 45.

WALLS, Furnace
M. H. Detrick Co., 140 Dearborn St, Chicago, Ill. See page 89.

WATCHES, Stop
Fort Worth Laboratories, 828½ Monroe St., Fort Worth, Texas See page 84.

WATERPROOFING, Compound
Celite Products Co., Van Nuys Bldg., Los Angeles, Calif. See front cover.
Johns-Manville, Inc., Madison Ave. at 41st St., New York City

WATER COLUMN
Graver Corp., 414 Todd Ave., East Chicago, Ind. See pages 3-33.

WELDING, Equipment
The Alexander Milburn Co., 1416-1428 W. Baltimore St., Baltimore, Md.
Carbic Mfg. Co., Duluth, Minn.
Economy Welding Machine Co., 5-9 W. 20th St., Kansas City, Missouri
John Dollinger, Jr., Inc., Beaumont, Texas
Henderson-Willis W. & C. Co., 2305-15 N. 11th St., St. Louis, Missouri
International Oxygen Co., 796 Frelinghysen Ave., Newark, N. J.
Modern Engineering Co., 3411-13 Pine Blvd., St. Louis, Mo.
General Electric Co., Schenectady, New York
Lincoln Electric Co., Kelly Ave. and 38th St., Cleveland, Ohio
Torchweld Equipment Co., 244 N. Carpenter St., Chicago, Ill.
U. S. Light & Heat Corp., Niagara Falls, N. Y.

Detroit Graphite Company

DETROIT, U. S. A.

DEGRACO PAINTS

All Colors for Your Particular Needs

Makers of paints for the Refinery, Tank Farm, Pipe Line, Tank Cars and Stations. A complete painting service.

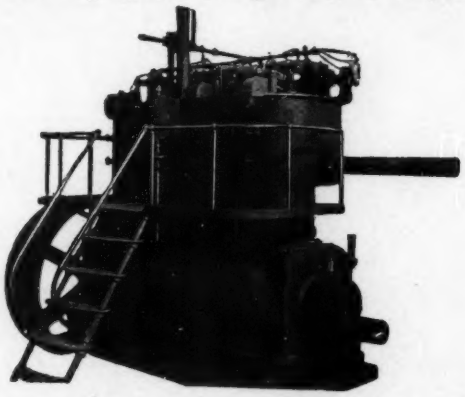
Write for catalogue on paints for the oil industry.

Offices and warehouse stocks in all principal cities

Bruce Macbeth Gas Engines — EFFICIENCY

28-165 H. P. Bruce-Macbeth Gas Engine—Without Water Jackets Installed by One Large Oil Company Last Year

3500 H. P. with Direct Connected Generator installed in one other large plant.



One customer replacing motors with Bruce-Macbeth Engine claims a saving of 35 per cent on power cost during year 1924.

Nine engines of this latest construction operated 24 hours per day, under full load, from last June to date, without grinding valve.

Specify Bruce-Macbeth Gas Engines on your next plant

THE BRUCE-MACBETH ENGINE CO.

Main Office and Works—Cleveland, Ohio

J. B. SIMLER, District Manager
209 South Cincinnati Avenue Tulsa, Okla.

ECONOMY — Bruce Macbeth Gas Engines

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Wilson Welder & Metals Co., Wilson Bldg., Hoboken, N. J.
Winfield Electric Welding Machine Co., 12 Atlantic St., Warren, O.
Air Reduction Sales Co., 342 Madison Ave., New York
Oxweld Acetylene Co., Thompson Ave. and Orton St., Long Island City, N. Y.

WHEELS, Sprocket
Jones, W. A., Foundry & Machine Co., 4415 Roosevelt Road, Chicago, Ill.

WHEELS, Fly
The Hill Clutch Machine & Foundry Co., Cleveland, Ohio

WHISTLES, Steam
American Schaeffer & Budenberg Corp., Berry & 5th St., Brooklyn, N. Y. See page 64.
J. E. Lonergan Co., 211-215 Race St., Philadelphia, Pa.
The Lunkenheimer Co., Cincinnati, Ohio. See page 14.

WINCHES, Pneumatic
Chicago Pneumatic Tool Co., 6 E. 44th St., New York City.

WINCHES, Safety Tank
General Machine Works, 3608 Polk Ave., Houston, Texas.
Westcott & Greis, Tulsa, Okla.
The Oil Conservation Engineering Co., Cleveland, Ohio.

WIRE, Line
Williamsport Wire Rope Co., Williamsport, Pa.

WIRE, Valve Spring
Ed. Schwartz Mill Supply Co., New Orleans, La.

WIRING SUPPLIES, Electric
Western Electric Co., Inc., Austin and Wood Sts., Dallas, Texas

WRENCHES
Sculley Steel & Iron Co., Chicago, Illinois
Bonney Forge & Tool Works, Allentown, Pa.
Larco Wrench & Mfg. Corp., 7800 Woodlawn Ave., Chicago, Ill.

WRENCHES, Pipe
Greenfield Tap & Tie Corp., Greenfield, Mass.
Larco Wrench & Mfg. Corp., 7800 Woodlawn Ave., Chicago, Ill.
Moore Drop Forging Co., Springfield, Mass.
Trimont Mfg. Co., 55 Amory St., Roxbury, Boston, Mass.
Walworth Mfg. Co., 142 High St., Boston, Mass.
Williams, J. H., & Co., 150 Hamilton Ave., Brooklyn, N. Y.

WRENCHES, Tap
The Champion Blower & Forge Co., Lancaster, Pa.

REFINERS' SUPPLIES

ACETIC ACIDS
Charles Lenning & Co., Philadelphia, Pa.

ALUMINUM POWDER
Aluminum Co. of America, 2400 Oliver Bldg., Pittsburgh, Pa.

AMMONIA
Barrett Co., 40 Rector St., New York, N. Y.
Herf & Frerichs Chem. Co., 925-32 Pierce Bldg., St. Louis, Mo.
The National Ammonia Co., 3600 N. Broadway, St. Louis, Mo.

ASH, bone
The Denver Fire Clay Co., P. O. Box 1107, Denver, Colo.

ASH, Soda
American Trona Corp., New York City
Arnold Hoffman Co., Providence, R. I.
Aubrey Bartlet Co., New Orleans, La.
Brunner, Mond of Canada, Ltd., Amherstburg, Ont.
Consumers Chemical Co., Philadelphia, Pa.
Globe Chemical Co., Cincinnati, O.
The Mathieson Alkali Works, 25 W. 43rd St., New York City
H. F. McMillan Co., New Orleans, La.
Michigan Alkali Co., 21 E. 40th St., New York City
Mound City Chem. Co., St. Louis, Mo.
Solvay Process Company, Syracuse, N. Y.
Welch Holme & Clark Co., 381 W. St., New York City, N. Y.
Wing & Evans, 40 Rector St., New York City.
Whitelaw Bros. Chem. Co., 318 S. Commercial St., St. Louis, Mo.

ASPHALT
The Philip Carey Co., Lockland, Ohio

BENZOL
Algoma Steel Corp., Ltd., Sault Ste. Marie, Ont.
Baker Chemical Co., Phillipsburg, N. J.
Barret Company, Ltd., Montreal, Quebec
Barrett Company, New York City
British Empire Steel Corp., Ltd., Montreal, Quebec
Carnegie Steel Co., Pittsburgh, Pa.
Colorado Fuel & Iron Co., Denver, Colorado
Cooper & Cooper, Inc., New York City
Dominion Tar & Chem. Co., Ltd., Sault St. Marie, Ont.
Globe Chem. Co., Cincinnati, Ohio
Illinois Steel Co., Chicago, Ill.
Jones & Laughlin Steel Co., Pittsburgh, Pa.
Jordan Coal-Tar Products Co., New York City.
Koppers Products Co., Pittsburgh, Pa.
Lackawanna Steel Company, Buffalo, N Y.
Mallinckrodt Chem. Works, St. Louis, Mo.
Sherwin-Williams Company, Cleveland, Ohio
Steel Company of Canada, Ltd., Toronto, Ont.
Tennessee Coal & Iron Co., Birmingham, Ala.
Toronto Chemical Co., Toronto, Ontario
Woodward Iron Co., Woodward, Alabama

BINS
The Berger Mfg. Co., Canton, Ohio
Gartner, F. W., Co., 3315 McKinney Ave., Houston, Texas

BINS, Ash
The Frederick Iron & Steel Co., Frederick, Maryland

CARBON BLACK
Carlton, A. S., 27 Haymarket Square, Mass.

CHEMICALS
Central Scientific Co., 460 E. Ohio St., Chicago, Ill.
The Denver Fire Clay Co., P. O. Box 1107, Denver, Colo.
The Kelbfleisch Corp., 31 Union Square, New York, N. Y.
Merck & Co., 45 Park Place, New York City
Parks-Davis & Co., New Orleans, La.
Pendleton & Arto, Houston, Texas
E. H. Sargent & Co., Chicago, Ill.
The Warner Chemical Co., 52 Vanderbilt Ave., New York City.

CHLORINE, Liquid
The Mathieson Alkali Works, Inc., 25 West 43rd St., New York City, N. Y.

FERTILIZER
Armour Fertilizer Works, Chicago, Illinois.

FILLER, Paste Iron
Kuhn Paint and Varnish Works, Houston, Texas

FULLERS EARTH
Attapulgus Clay Co., Attapulgus, Georgia
Southern Refractories Co., Fort Wayne, Ala.

HYDROGEN
International Oxygen Co., 796 Frelinghuysen Ave., Newark, N. J.

LARD OIL
Swift & Co., Houston, Texas

LIME
Whitelaw Bros. Chem. Co., 316 S. Commercial St., St. Louis, Mo.

LIME, Chloride of
Alpha Chem. Co., Ltd., Kitchener, Ontario
B. T. Babbitt, 15 W 34th St., New York City
H. J. Baker & Bros., New York City
Canada Color & Chem. Co., Ltd., Toronto, Ontario
Canadian Salt Co., Ltd., Windsor, Ontario
Champion Chem. Works, Chicago, Ill.
Charles Cooper & Co., New York City, N. Y.
Glenco Lime & Cement Co., St. Louis, Mo.
Grasselli Chemical Works, Cleveland, Ohio
Great Western Electrochemical Co., San Francisco, Calif.
Heil Chemical Co., St. Louis, Mo.
Arnold Hoffman & Co., Providence, R. I.
Lehigh Lime Co., Chicago, Ill.
Niagara Alkali Co., Niagara Falls, New York
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.
Produit Belgerde Montagny, Montagny, Que.
Sinclair Mfg. Co., Toledo, Ohio
Stuffer Chem. Co., San Francisco, California
John C. Wiarda & Co., Brooklyn, New York

LIME, Hydrated
Dittlinger Lime Co., New Braunfels, Texas

LIME, Lump
Dittlinger Lime Co., New Braunfels, Texas

LITHARGE
National Lead Co., 111 Broadway, New York City

NAVAL STORES
Columbia Naval Stores Co., New York City
Fernwood Lumber Co., Fernwood, Miss.
Frictionless Metal Co., 1450-60 Colling St., St. Louis, Mo.
Flynn-Harris-Bullard Company, Jacksonville, Fla.
General Naval Stores Co., New Orleans, La.
General Naval Stores, New York City
Georgia Resin Oil Co., Atlanta, Georgia
Gillican Supply Co., New Orleans, La.
Gilliconn Chipley Company, New Orleans, La.
Gulf Naval Stores Co., New Orleans, La.
Hercules Powder Co., East Wilmington, Delaware
Lutcher & Moore Turpentine Wks., Orange, Texas
McMillan Naval Stores Co., Beaumont, Texas
Wade & Sell, Trenton, Fla.
Woodward, Wright & Co., New Orleans, La.
Refiners Construction Co., 601 Transportation Bldg., Los Angeles, Calif.

OIL, Animal
Armour & Co., Fort Worth, Texas
Armour & Co., Kansas City, Mo.
Armour & Co., Chicago, Ill.
Armstrong Packing Co., Dallas, Texas.
Buffalo Refining Co., Buffalo, N. Y.
Canadian Packing Co., Ltd., Toronto, Ont.
Consolidated Rendering Co., Boston, Mass.
Cudahy Packing Co., Chicago, Ill.
Davidson Commission Co., Chicago, Ill.
Dodd Packing Co., Buffalo, N. Y.
Elbert & Co., 27 William St., New York, N. Y.
The Filtrol Company, Los Angeles, California
Gunns, Ltd., Toronto, Ont.
Harris Abattoir Co., Ltd., Toronto, Ont.
S. L. Jones & Co., San Francisco, California
S. F. Lawrason Co., London, Ont.
Lever Bros., Toronto, Ont.
Metalene Chemical Co., Cleveland, Ohio
Morris & Co., Kansas City, Mo.
National Oil Products Co., Harrison, N. J.
Palmolive Company, Ltd., Toronto, Ontario
T. T. Pergament & Co.. Produce Exchange, New York City. N. Y.
Proctor & Gamble Co., Cincinnati, Ohio
Pure Oil Co., Columbus, Ohio
Wm. C. Robinson & Son Co., Baltimore, Md.
Swift & Co., Kansas City, Mo.
Swift & Co., Chicago, Ill.
Swift Canadian Co., Ltd., Toronto, Ontario
Welch Holme & Clark Co., 381 W. St., New York City
Yocum, Faust, Ltd., London, Ont.

OIL, Fish
H. J. Baker & Bros., New York City
Balfour Guthrie & Co., Los Angeles, Calif.
Balfour, Guthrie & Co., San Francisco, Calif.
Cook & Swan Company, New York City
Consolidated Whaling Corp., Ltd., Victoria, B. C.
Fisheries Products Co., New York City
S. L. Jones & Co., San Francisco, Calif.
Globe Oil Mills, Los Angeles, Cal.
Hewlett Bros. Co., New York City
Maritime Fish Corp., Ltd., Montreal, P. Q.
North Pacific Trading Packing Co., San Francisco, Calif.
Oriental Vegetable Oils Co., San Francisco, Calif.
Pierce Oil Company, Columbus, O.
Pure Oil Co., Columbus, Ohio
Wm. Robinson & Son Co., Baltimore, Md.
Salem Oil Grease Co., Salem, Mass.
Sullivan Oil Co., Chicago, Ill.
Swan & Finch Co., New York City
Yocum, Faust, Ltd., London, Ont.

OIL, Gloss
Kuhn Paint and Varnish Works, Houston, Texas

OIL, Lard
Armour & Co., Kansas City, Mo.
Armour & Co., Chicago, Ill.
Fred G. Clark & Co., Cleveland, Ohio
Cudahy Packing Co., Chicago, Ill.
W. A. Freeman & Co., Ltd., London, Ont.
Harris Abattoir Co., Ltd., Toronto, Ontario
S. F. Lawrason & Co., Ltd., London, Ont.
Morris & Co., Kansas City, Mo.
Morris & Co., Chicago, Ill.
Wm. C. Robinson & Son, Baltimore, Md.
T. M. Sinclair & Co., Cedar Rapids, Iowa
Swan & Finch, New York City
Swift Canadian Company, Toronto, Ontario

Swift & Co., Kansas City, Mo.
Swift & Co., Chicago, Ill.
Welch Holme & Clark Co., 381 W. St., New York City
Wilson & Co., Chicago, Ill.
Wilson-Martin Co., Philadelphia, Pa.
Yocum, Faust, Ltd., London, Ont.

NEATSFOOT OIL
S. F. Lawrason Co., Ltd., London, Ont.
Morris & Co., Kansas City, Mo.
Wm. C. Robinson & Son Co., Baltimore, Md.
Sinclair & Co., Cedar Rapids, Ia.
Swift & Co., Kansas City, Mo.
Swan & Finch, New York City
Swift & Co., Chicago, Ill.
Swift Canadian Co., Ltd., Toronto, Ont.
Welch Holme & Clark Co., 381 W. St., New York City
Wilson & Co., Chicago, Ill.
Yocum, Faust, Ltd., London, Ont.

OIL, Pine
Carlton, A. S., 27 Haymarket Square, Boston, Mass.

OIL, Vegetable
Fred C. Adams Co., Chicago, Ill
American Cocoanut Butter Company, Chicago, Ill.
American Trading Co., San Francisco, Calif.
Anchor Refining Co., Jersey City New Jersey
Armstrong Packing Co., Dallas Texas
Blanton Company, St. Loius, Mo.
Canada Starch Co., Toronto, Ont
Cook & Swan Co. New York City.
A. Daigger & Co., Chicago, Ill.
Dayton Oil Co., Dayton, Ohio
Gunns, Ltd., Toronto, Ont.
Harris Abattoir Co., Ltd., Toronto, Ontario
Jones Packing & Preserving Co., Smith's Falls, Ont.
A. Klipstein & Co., New York City
Lever Bros., Toronto, Ontario
Liberty Cotton Oil Co., Oklahoma City, Okla.
Nacogdoches Oil Mill, Nacogdoches, Texas
Murray Oil Products Co., Philadelphia, Pa.
National Oil Products Co., Harrison, N. J.
National Oil Products Co., St. Louis, Mo.
Palmolive Company, Ltd., Toronto, Ontario
Oil & Chemical Corporation, Chicago, Ill.
Oriental Vegetable Oil Co., San Francisco, Calif.
Pure Oil Co., Columbus, Ohio
Rub-No-More Co., Fort Wayne Indiana
Werner G. Smith Co., Cleveland Ohio
Swan & Finch Co., New York City
Swift Canadian Co., Ltd., Toronto, Ontario
Swiftide Oil Co., Fairhaven, N. B
Thomson & Co., New York City
Welch Holme & Clark Co., 381 W. St., New York City

OLEIC ACIDS
Fred C. Adams Co., Chicago, Ill.
Armour & Co., Chicago, Ill.
Choates, Cooper & Co., New York City
Chas. Cooper & Co., New Yorl City
Davidson Commission Co., Chicago, Illinois
Dayton Oil Co., Dayton, Ohio
Emery Candle Co., Cincinnati, O
Grasselli Chemical Co., Toronto, Ontario
Mallincrodt Chemical, Co., St. Louis, Mo.
Merck & Co., New York City.
Proctor & Gamble Co., Cincinnati, Ohio
Rub-No-More Co., Ft. Wayne, Ind.
Welch Holme & Clark Co., 381 W. St., New York City
The M. Werk Co., Cincinnati, O
Wilson-Martin Co., Philadelphia. Pa.

OXIDE, Zinc
Carlton, A. S., 27 Haymarket Square, Boston, Mass.

OXYGEN
Air Reduction Sales Co., 342 Madison Ave., New York, N. Y.
International Oxygen Co., 796 Frelinghuysen Ave., Newark, N. J.
Linde Air Products Co., Carbide and Carbon Bldg., 30 E. 42nd St., New York, N. Y.

OILS, All Purposes
Monarch Mfg. Co., Council Bluffs Iowa

PERMANGANATE
Carus Chem. Co., LaSalle, Ill.

PLUGS, Tar
The Oil Conservation Engineering Co., Cleveland, Ohio

RESIN
Carlton, A. S., 27 Haymarket Square, Boston, Mass.

SAL SODA
Adams Chem. Co., Ltd., Montreal Quebec
American Trona Corp., New Yorl City
British American Paint Co., Ltd. Victoria, B. C.
California Soda Works, Los Angeles, Calif.
Church & Dwight Co., 19 Ceda St., New York City
Montreal, Quebec
Consumers Chemical Co., Philadelphia, Pa.
John Cowan & Co., Ltd., Montreal Quebec
General Chem. Co., New York City
Globe Chem. Co., Cincinnati, Ohio
Grasselli Chem. Co., Cleveland, O
S. F. Lawrason Co., Ltd., London Ontario
Leeds Chem. Co., St. Louis, Mo
Morton Salt Co., Chicago, Ill.
Mound City Chem. Co., St. Louis Missouri
National Crystals Co., Irvington New Jersey
Pennsylvania Chem. Works, Philadelphia, Pa.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.
E. M. Sergeant Co., 131 Cedar St., New York City
Stauffer Chem. Co., San Francisco, California
Swift & Co., St. Louis, Mo.
William Wilson & Son, Ltd., Toronto, Ont.

SODA, Bicarbonate of
The Mathieson Alkali Works, Inc., 25 W. 43rd St., New York City, New York.

SODA Caustic
B. T. Babbitt Co., 15 W. 34th St., New York City.
Aubrey Bartlett, New Orleans, La.
Brown Co., Portland, Maine
Canadian Salt Co., Ltd., Windsor, Ontario
Consumers Chem. Co., Philadelphia, Pa.
Diamond Alkali Co., Pittsburgh, Pa.
Dow Chem. Co., Midland, Ohio
General Chem. Co., New York City
Grasselli Chem. Co., St. Louis, Mo.
Arnold Hoffman & Co., Providence, R. I.
Mallinckrodt Chem. Co., St. Louis, Missouri
Mathieson Alkali Works, New York City
Michigan Alkali Works, Detroit, Michigan
Mound City, Chem. Co., St. Louis, Missouri
Nichols Chemical Co., Toronto, Ontario
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.
William D. Seymour Co., New Orleans, La.
Solvay Process Co., N. Y. City
Joseph Turner & Co., New Orleans, Louisiana
Welch Holme & Clark Co., 381 W. St., New York City
Wing & Evans, Columbus, Ohio
Whitelaw Brothers, St. Louis, Mo.

CRAIN Sectional Houses for every Industrial Purpose In Stock Always

CRAIN Sectional Houses Shipped from Stock On Receipt of Order

A Bungalow Colony of CRAIN SECTIONAL HOUSES, Houston, Texas.
An economical solution to your housing problems.

CRAIN READY-CUT HOUSES (Not Portable) for Permanent Homes

—Write, Wire, Phone—

CRAIN SECTIONAL HOUSES (Portable) for Industrial Purposes

CRAIN READY-CUT HOUSE CO.

Polk and Milby Sts. **HOUSTON** *Tel. Preston 3448*

Tell them where you saw the ad

SODA, Silicate of
Baugh & Sons Co., Philadelphia, Pennsylvania
Buckeye Soda Products Co., Cincinnati, Ohio
Cibora Mfg. Co., St. Louis, Mo.
General Chemical Co.. New York City
Globe Chemical Co., Cincinnati, Ohio
Grasselli Chemical Co., Cleveland, Ohio, St. Louis Mo., Hamilton, Ontario
Harshay, Fuller & Goodwin Co., Cleveland, O.
Mound City Chemical Co., St. Louis, Missouri
Philadelphia Quartz Co., Philadelphia Pa.
River Raisin Paper Co., Monroe, Michigan
Welch, Holme & Clark Co., New York City, N. Y.
Western Paper Makers Chemical Co., Kalamazoo, Mich.
Whitelaw Bros. Chem. Co. Co., St. Louis, Mo.

SULPHURIC ACID
Aetna Chem. Co., Drummondville, Quebec
Alabama Chem. Co., Montgomery, Alabama
Algoma Steel Corp.. Ltd., Sault St. Marie, Ont.
American Smelting & Refining Co., New York City
American Zinc, Lead & Smelter Co., St. Louis, Mo.
American Zinc and Chem. Co., Pitsburgh, Pa.
Atlas Power Co., Wilmington, Del.
British Empire Steel Corp., Ltd., Montreal, Que.
Central Chem. Co., Chicago, Ill.
Chemical Products, Ltd., Trenton, Ontario
Consolidated Mining & Smelting Co., Trail, B. C.
E. I. du Pont de Nemours & Co., Inc., Philadelphia, Pa.
Federal Chemical Co., Louisville, Kentucky
Fred G. Clark Co., Cleveland, Ohio
General Chem. Cc., New York City
Grasselli Chemical Co., Cleveland, Ohio
John Cowan Chem. Co., Ltd., Montreal, Que.
Illinois Zinc Co., Peru, Ill.
Mallincrodt Chem. Co., St. Louis, Missouri
Mineral Paint Zinc Co., St. Louis, Missouri
National Zinc Co., Kansas City, Missouri
New Jersey Zinc Co., 1111 Marquette Bldg., Chicago, Ill.
Nochols Chem. Co., Ltd., Montreal, P. Q.
Southern Acid & Sulphur Co., Port Arthur, Texas
So. Acid & Sulphur Co., St. Louis, Missouri
Southern Agricultural Chem. Co., Atlanta, Ga.
Stauffer Chem. Co., San Francisco, California
Tennessee Copper & Chem. Corp., Lockland, Ohio
The Texas Chem. Co., Scanlan Bldg., Houston, Texas
United Chem. & Organic Products Co., New Orleans, La.
Victor Chem. Works, Chicago, Ill.
Victoria Chem. Co., Ltd., Victoria, B. C.
Virgina-Carolina Chem. Co., Richmond, Va

TAR, Kiln
Carlton, A. S., 27 Haymarket Square, Boston, Mass.

TAR, Pine
American Tar & Turpentine Co., New Orleans, La.
American Turpentine Co., New Orleans, La.
Atlantic Turpentine & Pine Tar Co., Savannah, Ga.
Columbia Naval Stores Co., New York City
E. Fielding & Sons, Keating St., Toronto, Ont.
Fernwood Lumber Co., Fernwood, Miss.
Flyn Harris Bullard Co., Jacksonville, Fla.
General Naval Stores Co., New Orleans, La.
General Naval Stores, New York City
Georgia Pine Turpentine Co., New York City
Gulf Naval Stores Co., New Orleans, La.
Pensacola Tar & Turpentine Co., Gulf Point, Fla.
Morton, Hoyt & Milne, Inc., San Francisco, Calif.
Southern Pine Extracts Co., Pensacola, Fla.
Union Chem. Cc , Boston, Mass.
Wade & Bell, Trenton, Fla.

TAR Retort
Carlton, A. S., 27 Haymarket Square, Boston, Mass.

TAR PRODUCTS Coal
Sherwin-Williams Co., Houston, Texas
Pulmosan Safety Equipment Co., 45 Willoughby St., Brooklyn, New York
Wilson Welder & Metals Co., Wilson Bldg., Hoboken, N. J.
Modern Engineering Co., 3411-11 Pine Blvd., St. Louis, Mo.
Wm. W Nugent & Co., Inc., 410-412 N. Hermitage Ave., Chicago, Illinois
Manzel Bros. Co., 309 to 319 Babcock St., Buffalo, N. Y.
The Lunkenheimer Co., Cincinnati, Ohio
Pulmosan Safety Equipment Co., 45 Willoughby St., Brooklyn, New York

Measuring Pressures and Temperatures in the Refinery

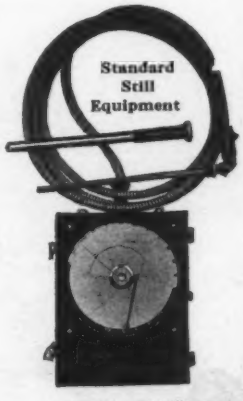
SCHAEFFER & Budenberg Indicating and Recording Gauges and Thermometers for the Refinery are designed and constructed with the aid of a knowledge of Refinery requirements gained by many years of service and thorough study.

They are standard in many prominent Refineries—found best by actual test.

Our Engineering Service Department will be glad to have you place your problems before it.

Our General Catalog N-16 will be found highly interesting and instructive. A copy is yours for the asking.

Reform Mercury Dial Thermometer. Temperatures up to 1000° F.



Columbia Recording Thermometer. Temperatures Up To 1000° F.

American Schaeffer & Budenberg Corporation

Succeeding
The Schaeffer & Budenberg Mfg. Co.
American Steam Gauge & Valve Mfg. Co.
Hohmann-Nelson Company

BROOKLYN, N. Y.

*Boston, Buffalo, *Chicago, Cleveland, Detroit, *Los Angeles, Philadelphia, *Pittsburgh, Tulsa, Salt Lake City, *Seattle

*Stock carried at these branches.

Handbook on Geology

Outlines of the Occurrence and Geology of Petroleum is an introductory handbook which has recently been released from the press by I. A. Stigand, M. A., and F. G. S.

This book, as its title suggests, is elementary in character, having as its main object the supplying of an outline of the general features concerning the occurrence and geology of petroleum. Subject matter of the book is presented in a condensed form and is of such nature as to be of value to those interested in the economic or commercial aspects of petroleum, as well as to the student geologist.

Discussions contained in the book are limited to the more pertinent theoretical questions and practical considerations, or the general topics of interest; and where possible, is illustrated by reference to known examples in the field.

In addition to seven chapters of the book proper, there is an appendix confined to geophysical methods as applied to oil-finding, by Dr. M. Juhlberg, Arrau, Switzerland.

Copies of the book may be obtained from the Gulf Publishing Company, P. O. Box 1307, Houston, Texas. Price $4.00.

PRODUCERS
REFINERS
MARKETERS
TRANSPORTERS

TEXHOMA OIL & REFINING COMPANY

WICHITA FALLS, TEXAS

To the Natural Gasoline Industry

The Association of Natural Gasoline Manufacturers is entering its fifth year of existence. Organized for the sole purpose of helping the entire industry it has proved its worth in many instances. It has justified its existence.

Founded at a time when the industry was in dire need, it alleviated that need within a few months. As problems presented themselves, it was ready and able to overcome them to the lasting benefit to our branch of the petroleum industry.

It has served no special interest or interests. Organized for the greatest good to the greatest number, it has not only helped its members but every other manufacturer of natural gasoline in equal proportions.

It has been harmonious in its relations not only with the members, with the other manufacturers, and with the other branches of the petroleum industry as well. Strife in the organization is unknown; it has not antagonized anyone.

The Association of Natural Gasoline Manufacturers has reached its high place in the industry due to the faith and confidence of the members of the organization. That this confidence is justified is shown by their moral and financial support since the birth of the Association.

The Association of Natural Gasoline Manufacturers believes it has reached a place where it is justified in asking financial support through membership of every manufacturer of natural gasoline in the country. It has long had the moral support. It should have the financial support as well.

The Fourth Annual Convention of the Association will be held April 22-23, at the Hotel Mayo, Tulsa. Following its policy, everyone, whether he be a member or not is cordially invited to attend. In line with the usual policy of the organization there will be no "gunning" for members.

The program is built especially this year on plant problems. It will interest executives, technical men and plant operators. All are welcome.

Remember the Date and the Place

Association of Natural Gasoline Manufacturers

504 Cosden Building **Tulsa, Oklahoma**

OFFICERS of The Association of Natural Gasoline Manufacturers

Tidal Refining Company
Tidal-Western Oil Corporation
Tidal-Chelsea Refining Company

Subsidiaries Tidewater Oil Company

REFINERIES: DRUMRIGHT, OKLA., AND BURKBURNETT, TEXAS

NATURAL GASOLINE PLANTS IN KANSAS, OKLAHOMA AND TEXAS

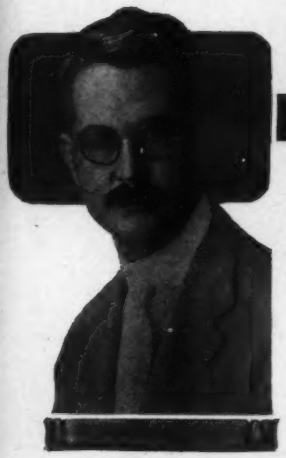
MANUFACTURERS AND MARKETERS

OF

REFINERY PRODUCTS AND NATURAL GASOLINE

GENERAL OFFICES: TULSA, OKLA.

EXECUTIVE COMMITTEE of The Association of Natural Gasoline Manufacturers



L. C. RITTS

R. R. OWENS

A. J. SCHLOSSER

W. A. MELTON

H. R. JOHNSON

E. C. MOCKLEY

J. A. RAFFERTY

K. L. REYNOLDS

LLOYD E. BAYER

JOHN M. HALL

EMBY KAYE

Steel Buildings

We design and build warehouses, engine houses, booster plants, loading racks, tower supports, anything in structural steel.

Put your building problem up to "Indco".

Our buildings are built of steel . . . on the unit plan . . . designed by engineers who understand your needs.

Their low cost . . . quick delivery . . . speed of erection . . . appearance . . . will make them attractively fit into your building program.

Their reputation with those who use them is their best endorsement.

Let us estimate your next building.

Industrial Construction Co.,

412 Central Nat. Bank Bldg.,
Tulsa Oklahoma

Tell them where you saw the ad

Producers, Refiners and Natural Gasoline Manufacturers

NOBLE

Buyers and Sellers of High Grade Products

Noble Oil & Gas Co. -:- **WRIGHT BUILDING Tulsa, Oklahoma**

Tell them where you saw the ad

Natural Gasoline

Our customers are sure of service on these guaranteed grades

GRADE "DOUBLE A"
Recovery
Not less than 90%
End Point
Not over 375° F.
Gravity....80.0 to 87.9° Be.

GRADE "A"
Recovery
Not less than 90%
End Point
Not over 375° F.
Gravity....72.0 to 79.9° Be.

GRADE "C"
Recovery
Not less than 78%
End Point
Not over 375° F.
Gravity....80.0 to 90.0° Be.

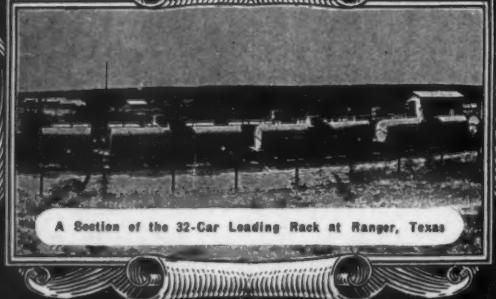
GRADE DOUBLE "B"
Recovery
Not less than 85%
End Point
Not over 375° F
Gravity....84.0 to 92.0° Be.

GRADE "B"
Recovery
Not less than 85%
End Point
Not over 375° F.
Gravity....76.0 to 83.9° Be.

All these grades, the Official Specifications for Natural Gasoline as adopted and issued by the Association of Natural Gasoline Manufacturers, are made by us.

CHESTNUT & SMITH CORPORATION

GENERAL OFFICES-CHESTNUT & SMITH BLDG.- TULSA, OKLA.



A Section of the 32-Car Loading Rack at Ranger, Texas

Stabilizing An Industry

PRIOR to the formation of the Association of Natural Gasoline Manufacturers, the business of converting petroleum vapors into a marketable product was as haphazard as the product was uncontrollable.

It was casinghead gasoline then. And casinghead gasoline was the bad boy of the petroleum family. Uniform specifications were not known. What the maker loaded into a tank truck and what the buyer received often were different matters.

Accordingly, prices were fickle as a weather vane. The fullness of storage tanks often determined price. Often gasoline was loaded in tank cars and it went to the first buyer at whatever price offered. There were instances of gasoline being refused at its destination, where it was sold at ridiculous prices.

But with the formation of the Association of Natural Gasoline Manufacturers, the unruly disposition of the wayward son of the petroleum family was put under control. The product went through a new baptisim, coming out as Natural asoline.

Of the accomplishments of the organization, that of defining grades comes well toward the top. The buyer of Natural Gasoline orders on specifications, knowing his wants can be filled in every particular.

The use of Natural Gasoline has been broadened under these conditions, with the result that the business has grown, while prices offer a more even tenor.

Manufacturing methods have improved in the past four years and the tendency is toward further improvement. While this may not be credited to the organization, it is significant that those concerns holding membership in the Association of Natural Gasoline Manufacturers are the leaders in improved manufacturing methods.

Something new in the activities of an association developed two years ago at the annual meeting in Tulsa. Someone suggested that the operators of gasoline plants be given time to discuss their problems in an open meeting. The result was a session that surpassed anything that had been hoped for it.

Better still, it led to the plant operators' meetings held throughout the Mid-Continent district during the summer of 1924. At these sessions, sponsored by the Association, the operators of gasoline plants gathered in open session and followed a fixed program. While some papers were read and some speeches were made, these meetings developed impromptu discussion of solution of common problems in the making of natural gasoline.

The Association of Natural Gasoline Manufacturers offers the paradox of a small organization that is large. Its membership is fewer than 50 but the daily output of its membership is in excess of 1,000,000 gallons of natural gasoline.

The association represents a phase of the petroleum industry marked for its conservation of natural resources. Natural Gasoline is a product that would be lost, were its manufacturers to cease operating their plants. It can almost be said, it is taken from the air.

As an organization, the Association of Natural Gasoline Manufacturers has determined its purpose and is striving to fulfill it.

PROGRAM

Program of the Fourth Annual Convention of the Association of Natural Gasoline Manufacturers Mayo Hotel, Tulsa, April 22-23.

WEDNESDAY, APRIL 22

10 o'Clock

Address of Welcome.....F. L. Chase
Operating Manager Lone Star Gas Company, Dallas, Texas

Annual Address .....D. E. Buchanan
President Association of Natural Gasoline Manufacturers, Tulsa

"Fire Prevention" .....H. L. Shoemaker
Assistant Chief Engineer, Standard Oil Company of New Jersey, N. Y.

Appointment of Nominating Committee.

Afternoon Session

2:00 P. M.

"Absorption Oil" .....A. F. Maxon
Plant Engineer, Sun Company, Tulsa

Discussion led by R. R. Dean, Assistant Superintendent Gasoline Department, Waite Phillips Company, Tulsa

"Treating" .....W. G. Hiatt
Research Engineer, Phillips Petroleum Company, Bartlesville, Oklahoma

Discussion led by R. M. Coyle, Assistant Superintendent, Chestnut & Smith Corp., Ranger, Texas

THURSDAY, APRIL 23

10 o'Clock

Report of Secretary and Treasurer.

Election of Officers.

"The California Outlook".....Harry J. Bauer
President Pacific Gasoline Company, Los Angeles, California

2:00 P. M.

"Water Supply and Water Treatment"....Emby Kaye
General Superintendent Gasoline Department, Skelly Oil Company, Tulsa

Discussion led by S. C. Carney, Superintendent Gasoline Department, Roxana Petroleum Company, Tulsa.

"Residue Gas" .....L. F. Bayer
Vice President and General Manager, Tidal Refining Company, Tulsa.

Discussion led by J. H. Boyle, Secretary-Treasurer, Chestnut & Smith Corp., Tulsa.

"Plant Lubrication".....C. A. Fitzgerald
Assistant District Manager, Sun Company, Tulsa.

Discussion led by G. M. Davidson, General Superintendent Operation and Construction, Empire Gasoline Company, Bartlesville, Okla.

Night

Annual Banquet, Mayo Hotel

PHILLIPS PETROLEUM COMPANY

GENERAL OFFICE:

BARTLESVILLE, OKLA.

W

Absorption Gasoline

Grade A Double A

Grade B Double B

Grade C

26 Plants Located Throughout Oklahoma, Louisiana and Texas

Roster of Association of Natural Gasoline Manufacturers

AKIN GASOLINE COMPANY, headquarters Tulsa, Oklahoma. J. H. McCoy, president; G. N. Whithington, vice president; H. R. Johnson, secretary-treasurer; R. R. Rosier, sales manager. Three plants in Oklahoma. Daily capacity 2,000 gallons.

* * *

AMERADA PETROLEUM CORP., headquarters New York, operating office, Tulsa. Thomas J. Ryder, president; E. DeGolyer, vice president; M. E. Mockley, superintendent gasoline department. Three plants in Oklahoma. Daily capacity 30,000 gallons.

* * *

AMITY GASOLINE COMPANY, headquarters Sisterville, West Virginia; branch office, Bartlesville, Okla. W. J. Neuenschwander, president; W. L. Sutton, vice president; Georg S. Bradfield, treasurer; J. B. Clark, assistant treasurer; W. O. Harrington, secretary; Charles N. Kimball, assistant secretary; H. G. Ellis, manager. Five plants in Oklahoma. Daily capacity of 7,000 gallons.

* * *

ARKANSAS FUEL OIL COMPANY, headquarters Shreveport, Louisiana.

* * *

BARNSDALL OIL COMPANY, headquarters New York City; branch offices, Chicago, Tulsa, Kansas City and St. Louis. E. B. Rosser, president; E. O. Bartlett and R. F. McArthur, vice presidents; J. T. Furlong, treasurer; T. D. Mussner, assistant secretary and treasurer. Five plants in Oklahoma, four in Pennsylvania, two in West Virginia and one in Ohio.

* * *

CALIFORNIA GASOLINE CORPORATION, headquarters Los Angeles, California. R. E. Bering, president; J. E. Hare, secretary-treasurer. Four plants in California. Daily capacity 50,000 gallons.

* * *

CARBIDE AND CARBON CHEMICALS CORP., headquarters New York; W. F. Barrett and J. A. Rafferty, vice presidents in charge of gasoline and related departments. One plant in West Virginia. Daily capacity, 2,000 gallons.

* * *

CHESTNUT & SMITH CORPORATION, headquarters Tulsa. T. K. Smith, president; E. I. Hanlon, vice president; D. E. Buchanan, vice president; J. H. Boyle, secretary; C. S. Quinlan, treasurer; A. F. Wood, sales manager. Ten plants in Texas; four in Oklahoma. Daily capacity, 235,000 gallons.

* * *

CUMBERLAND GASOLINE CORPORATION, headquarters Cleveland, Ohio. M. A. Monaghan, president; M. H. Rourke, vice president; C. J. Weideman, treasurer. One plant in Kentucky. Daily capacity, 5,000 gallons.

* * *

DEER CREEK GASOLINE COMPANY, headquarters Tulsa, Oklahoma. Dean E. Foster, president and general manager. One plant in Oklahoma. Daily capacity, 2,500 gallons.

* * *

DE SOTO GASOLINE COMPANY, headquarters Beaumont, Texas. H. C. Wiess, president; W. B. Flynn, vice president; P. B. Flynn, general manager; J. G. Whitehurst, secretary. Two plants in Oklahoma, one in Louisiana.

* * *

DEWEY PORTLAND CEMENT COMPANY, headquarters Dewey, Oklahoma. H. F. Tyler, sales manager. One plant in Oklahoma. Daily capacity, 2,000 gallons.

* * *

DIAMOND REFINING COMPANY, headquarters Kansas City, Mo., branch office, Tulsa. B. E. Bush, president; Walter Mitchell, vice president; Thomas E. Elliott, secretary. Four plants in Oklahoma. Daily capacity, 8,000 gallons.

* * *

EAGLE PICHER LEAD COMPANY, headquarters Chicago. W. N. Corbet, superintendent gasoline department. One plant in Oklahoma. Daily capacity, 2,500 gallons.

* * *

EMPIRE GASOLINE COMPANY, headquarters Bartlesville, Oklahoma, subsidiary Empire Gas & Fuel Co., H. L. Doherty, president; H. D. Frueauff and H. R. Straight, vice presidents; C. E. Murray, secretary; D. W. Harris, treasurer; E. L. Peck, manager. Five plants in Kansas, one in Oklahoma. Daily capacity, 45,000 gallons.

* * *

FALLING ROCK CANNEL COAL COMPANY, headquarters Charleston, West Virginia. One plant in West Virginia.

* * *

HESCO GASOLINE COMPANY, headquarters Tulsa. R. J. Lindsay, president; B. R. Graham, vice president; J. M. Story, secretary. One plant in Oklahoma. Daily capacity, 600 gallons.

* * *

HIGHWAY OIL REFINING COMPANY, headquarters, Tulsa. F. I. Louis, president; F. A. Baker, E. D. Davis and F. C. Kaths, vice president; W. E. Burk, secretary. Five plants in Oklahoma. Daily capacity, 4,000 gallons.

Have You Considered the Gasoline Stabilizer for Your Plant?

The quality of your product is improved and the yield increased with no initial investment for The Stabilizer.

The correct equipment for your individual plant is determined by our engineers without cost to you.

Our nationally known organization assures you of prompt installation of the apparatus and dependable engineering service during its operation.

Carbide and Carbon Chemicals Corporation

General Offices
Carbide and Carbon Building,
30 East 42nd Street
New York

Mid-Continent Field
Exchange National Bank Building
Tulsa, Oklahoma

Pacific Coast
Balfour Building
San Francisco, California

HURLEY GASOLINE COMPANY, headquarters, Tulsa. A. E. Hurley, president; A. W. Leonard and J. W. Hurley, vice presidents. C. E. Hurley, secretary-treasurer. Two plants in Texas.

* * *

LIQUEFIED PETROLEUM GAS COMPANY, headquarters Tulsa. J. A. Hull, president; W. H. Kiser, secretary; H. E. Tyrrell, treasurer. Two plants in Oklahoma. Daily capacity, 5,000 gallons.

* * *

LOMITA GASOLINE COMPANY, headquarters long Beach, California. F. R. Bain, president; F. S. Wade, secretary-treasurer; A. T. Jergins, vice president. One plant in California. Daily capacity, 13,000 gallons.

* * *

LONE STAR GAS COMPANY, headquarters Dallas, Texas. A. B. Denning, president; R. A. Crawford Jr., vice president; D. L. Cobb, secretary; F. L. Chase, managing director. Four plants in Texas. Daily capacity, 22,000 gallons.

* * *

MARLAND REFINING COMPANY, headquarters Ponca City, Oklahoma. E. W. Marland, president; S. C. Collins and Walter Miller, vice presidents; Charles E. Stephenson, secretary; R. E. Clark, treasurer. One plant in Oklahoma.

* * *

OIL STATE GASOLINE COMPANY, headquarters Tulsa; sales office Columbus, Ohio. Oscar R. Howard, president; E. A. Ross, vice president; C. E. Duffield, treasurer; Dalton Lain, secretary. Three plants in Oklahoma. Daily output, 6,000 gallons.

* * *

OKLAHOMA EASTERN OIL COMPANY, headquarters, Tulsa, Oklahoma. J. H. Evans, president; J. P. Flynn, vice president; L. C. Ritts, vice president and treasurer; C. A. O'Donovan, secretary. Five plants in Oklahoma. Daily output, 5,000 gallons.

* * *

OKLAHOMA GASOLINE PLANTS, INC., headquarters, Oklahoma City; branch offices, Sapulpa and Drumright. One plant in Oklahoma. Daily output, 4,000 gallons.

* * *

PACIFIC GASOLINE COMPANY, headquarters Los Angeles; branch offices Taft and Whittier, California. Harry J. Bauer, president; A. N. Kemp, S. M. Kennedy and Fred L. Baker, vice presidents; Kenyon L. Reynolds, assistant general manager; Alfred Wright, associate counsel; A. E. Morphy, secretary-treasurer; H. F. Deenan, director; R. E. Beckley, general superintendent. Twenty-three plants in Oklahoma. Daily output, 160,000 gallons.

* * *

THE PALMER CORPORATION, headquarters Shreveport, Louisiana.

Skelly Oil Company

Producers, Refiners, Manufacturers and
Distributors of Petroleum and
Its Products

TULSA, OKLAHOMA

Producers of
Crude Petroleum

Manufacturers of
Absorption Gasoline

Oklahoma Eastern Oil Company

TULSA, OKLAHOMA

Phones—L. D. 8 and 9; Tulsa 6163

P. O. Box 1483

117 West Fourth Street

Tell them where you saw the ad

PHILLIPS PETROLEUM COMPANY, headquarters Bartlesville, Oklahoma; branch office Ranger, Texas. Frank Phillips, president; L. E. Phillips, vice president; Clyde H. Alexander, vice president; John H. Kane, vice president; H. E. Hoopman, treasurer; F. E. Rice, superintendent gasoline department. Thirteen plants in Texas; twelve in Oklahoma and one in Louisiana.

* * *

PRAIRIE OIL & GAS COMPANY, headquarters Independence, Kansas; branch office, Tulsa. W. S. Fitzpatrick, chairman of the board; Nelson K. Moody, president; Dana H. Kelsey, vice president and general manager; E. T. Patterson, treasurer; J. A. Hollihan, secretary. Maintain gasoline department but do no manufacturing.

* * *

PULASKI OIL COMPANY, headquarters, Tulsa. H. E. Tyrrell, president; E. B. Huston, vice president and treasurer; E. B. Miller, vice president; E. M. Cardiff, secretary. Two plants in Oklahoma. Daily output, 5,000 gallons.

* * *

ROESER & PENDLETON, INC., headquarters Breckenridge, Texas. Charles F. Roeser, president; T. T. Pendleton, vice president; Marshall R. Young, secretary and treasurer. Three plants in Texas. Daily output, 35,000 gallons.

ROTARY GASOLINE COMPANY, headquarters Tulsa, Oklahoma. F. I. Louis, president; C. E. Duffield, vice president; W. C. Elliott, treasurer; O. W. Crick, secretary. One plant in Oklahoma. Daily output, 900 gallons.

* * *

SAND SPRINGS HOME (Gasoline Department) headquarters Sand Springs, Oklahoma. Charles Page, president; C. F. Tingley, secretary; Harrison H. Young, general superintendent. Two plants in Oklahoma. Daily output, 4,000 gallons.

* * *

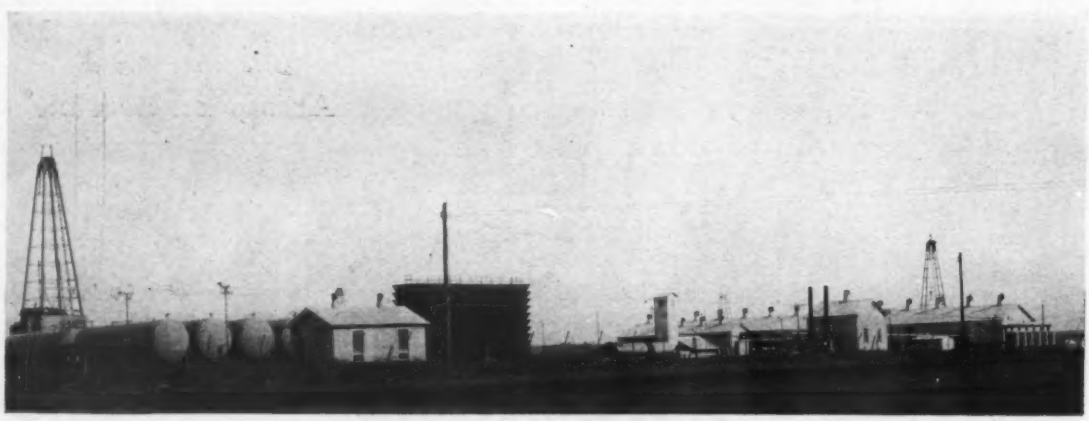
SKELLY OIL COMPANY, headquarters, Tulsa; branch offices, El Dorado, Kansas and Kansas City, Mo. W. G. Skelly, president; C. C. Herndon, vice president; F. A. Pielsticker, vice president; Emby Kaye, superintendent gasoline department. Seven plants in Oklahoma and two in Texas. Daily output, 100,000 gallons.

* * *

SOUTHLAND GASOLINE COMPANY, headquarters, Tulsa. B. J. Arbon, president; R. E. Williamson, treasurer; B. H. Arbon, secretary. Two plants in Oklahoma.

* * *

STEBBINS OIL & GASOLINE COMPANY, headquarters Tulsa. J. Ray Stebbins, vice president; C. E. Nelson, secretary; Ida M. Johnston, treasurer.



EMPIRE GASOLINE COMPANY

MANUFACTURERS AND MARKETERS

NATURAL GASOLINE

CENTRAL OFFICES: BARTLESVILLE, OKLA.

A SUBSIDIARY EMPIRE GAS AND FUEL CO.

SUNOCO

Absorption Oil Manufactured Especially

for

Gasoline Plants

Ask for Samples and Quotations

SUN COMPANY

Office: Tulsa, Oklahoma **Refinery: Yale, Oklahoma**

The Association of Natural Gasoline Manufacturers has become a National affair. The use of natural gasoline has become indispensable to the refiner of crude oil.

Natural gasoline is produced largely from casing-head gas which is in turn produced from crude oil taken at the well. The operation of the natural gasoline plants is so interwoven with the operation of oil producing properties as to be inseparable.

The National Association of Independent Oil Producers co-operates with the Association of Natural Gasoline Manufacturers at all times in bringing about harmony between these two inseparable branches of the industry.

National Association of Independent Oil Producers

W. H. GRAY, President

408 Wright Building Tulsa, Oklahoma

Two plants in Oklahoma and one in Arkansas. Daily output, 4,000 gallons.

* * *

TEXAS PACIFIC COAL & OIL COMPANY, executive offices Fort Worth, Texas; general offices, Thurber, Texas. Edgar L. Marston, chairman of the board; J. R. Penn, president; Edgar J. Marston, vice president and treasurer; Robert S. King and E. R. Lederer, vice presidents; Herman W. Knox, secretary. Two plants in Texas. Daily output, 9000 gallons.

* * *

TIDAL REFINING COMPANY, headquarters Tulsa, Oklahoma. E. L. Shea, president; Lloyd F. Bayer, vice president and general manager; W. C. Franklin, vice president; D. W. Bell, secretary and treasurer; A. D. Kennedy, assistant secretary and treasurer; J. N. Robinson, assistant secretary. Eight plants in Oklahoma, two in Texas and one in Kansas. Daily output, 60,000 gallons.

* * *

TRANSCONTINENTAL OIL COMPANY, headquarters Pittsburgh; branches Tulsa, Fort Worth. F. B. Parriott, president; O. D. Robinson, T. R. Cowell, J. C. Adams, M. W. Bottomfield, vice presidents; E. D. Robinson, secretary and treasurer; C. M. Ramsey, assistant treasurer. Ten plants in Oklahoma, six in West Virginia, one in Ohio and one in Texas. Dailey output, 20,000 gallons.

TRIBES GASOLINE COMPANY, headquarters, Tulsa. W. H. Gray, president; Ira E. Cornelius, vice president and general manager. Three plants in Oklahoma. Daily output, 5000 gallons.

* * *

TWIN STATE OIL COMPANY, headquarters, Tulsa. J. Edgar Pew, president; A. M. Ballard, general manager. One plant in Oklahoma. Daily output, 2000 gallons.

* * *

VICTOR GASOLINE COMPANY, headquarters, Tulsa. M. F. Powers, president; C. P. Quinlan, vice president; A. D. Blackard, treasurer; R. A. Koons, secretary. Three plants in Oklahoma. Daily output, 11,000 gallons.

* * *

WAITE PHILLIPS COMPANY, headquarters, Tulsa; branch offices, Kansas City and Little Rock. Waite Phillips, president; R. B. Pringle, J. D. Hill, vice presidents; H. L. Skinner, secretary and treasurer. R. R. Dean, superintendent gasoline department. Two plants in Oklahoma, one in Kansas. Daily output, 35,000 gallons.

* * *

WENTZ OIL CORPORATION, headquarters Ponca City, Oklahoma. L. H. Wentz, president. Two plants in Oklahoma. Daily output, 25,000 gallons.

THE OIL STATE GASOLINE COMPANY

Manufacturers of

ALL GRAVITIES STEAM
BLENDED GASOLINE

General Offices:
409 Kennedy Building
TULSA -:- OKLAHOMA

AMITY GASOLINE COMPANY

PRODUCERS OF
NATURAL GASOLINE

BARTLESVILLE, Oklahoma SISTERSVILLE, West Virginia

BE SQUARE
NATURAL GASOLINE
U. S. MOTOR FUEL
BRIGHT STOCK
CYLINDER STOCKS
RED AND PALE OILS

BARNSDALL REFINING COMPANY
SUBSIDIARY BARNSDALL CORPORATION

910 S. Michigan Ave., Chicago, Ill.

New York Pittsburgh St. Louis St. Paul Denver Los Angeles Kansas City Tulsa

Refinery: Barnsdall, Okla. Cable Address: Barnsdall, Chicago

Tell them where you saw the ad

Where Electric Pyrometers have the advantage over any Thermometer, for so many oil refinery installations.

A typical oil refinery board with Brown Pyrometers at work on the applications for which each is suited

Because we make both Pyrometers and Thermometers, this comparison is unbiased.

1—A pyrometer equipment—insures continuous service. It is rugged. It can, if necessary, be repaired or readjusted on the spot—quickly. A thermometer bulb and tubing is much more vulnerable. When punctured the entire equipment must be sent to the factory for refilling and calibrating.

2—A Thermo-Electric Pyrometer gives higher accuracy—an absolutely essential feature.

3—Being electrical, a Pyrometer may be located at any distance—a simple matter of wiring.

Let us work with you on your temperature measuring problems. Our suggestions will be based on practical experience.

Address THE BROWN INSTRUMENT COMPANY, 4536 Wayne Ave., Philadelphia, Pa., or one of our district offices in New York, Boston, Pittsburgh, Detroit, Chicago, Birmingham, HOUSTON, TULSA, ST. LOUIS, Denver, Salt Lake City, San Francisco, Los Angeles or Montreal

Brown Pyrometers AND Thermometers

Most Used in the World **15 Constructional Advantages**

The South's Largest Wholesaler of

Natural Gas

LONE STAR GAS COMPANY

Dallas, Texas

Tell them where you saw the ad

RECENT REFINERY PATENTS ISSUED

BY STAFF REPRESENTATIVE

Washington, D. C.—The following patents of interest to the refining industry were granted by the United States Patent Office during the month of March:

Reducing Petroleum

No. 1,528,327, granted March 3, to John Hancock, Webster Groves, Mo., through Myrtle C. Hancock, administratrix of said John Hancock, deceased, for a process of reducing petroleum oil which consists in reducing the oil to a whirling spray, passing the spray of oil into a spray of steam, injecting a spray of a chemical solution into the mass of oil and steam to emulsify the oil in the presence of the chemical, successively heating the emulsified oil to increasing degrees of temperature to crack the oil, cooling the product, and fractionating the cooled product.

Hypochlorite Solution

No. 1,528,398, granted March 3, to Benjamin T. Brooks, Sound Beach, Conn., and Harrison O. Parker, Howard Beach, N. Y., assignors to the Mathieson Alkali Works, Inc., New York, for a method of refining cracked hydrocarbon distillates which comprises subjecting the same to treatment with hypochlorite solution, and subsequently distilling the same in the presence of a trace of aluminum

New Type Still

No. 1,528,520, granted March 3 to William D. P. Aims, Philadelphia, for a petroleum still comprising the combination of a heat retaining casing or cabinet having top and bottom outlets for the distillate and residuum respectively, a series of superposed internally heated heaters and slit-bottom troughs alternated with the heaters and arranged in the casing or cabinet and space from the side walls thereof, valves operable from the exterior of the casing and appertaining to the respective heaters for regulating the heat of the heaters independently, and means for introducing the material to be distilled onto the top heater, substantially as described.

For Making Substitute

No. 1,528,884, granted March 10 to Harold T. Maitland, Sharon Hill, Pa., assignor to Sun Oil Company of New Jersey, for a process of manufacturing a composition adapted for use in making a linseed oil substitute, drying oil, etc., which comprises manufacturing fatty acid soaps from mineral oil, dissolving the soaps in a hydrocarbon solvent, treating the solution successively with a mineral acid and with aluminum sulfate, separating out the water containing the salt, and distilling off the solvent.

Treating Oils

No. 1,528,968, granted March 10 to

FOR CLEANING INSIDE
Tanks—Vats—Tank Cars
With Safety Use the
Pulmosan Airline Mask

Complete protection for the operator, using fresh air at all times.

Arms, Legs and Body always free to work with.

Furnished in neat durable carrying case.

Larger outfit can be supplied with light blower and durable case for extra heavy work.

Prices and Literature on Application

Pulmosan Safety Equipment Co.
MANUFACTURERS
47 Willoughby Street Brooklyn, N. Y.

PIONEER
TANK & BOILER Co.
TULSA-OKLA

Oil Refinery Tankage
CRUDE and STEAM STILLS
CONDENSER BOXES
AGITATORS, TOWERS
HEAT EXCHANGERS
SEPARATORS
STORAGE and PRESSURE TANKS
ETC.

Steel Warehouse Dept.
STEEL PLATES, SHEETS
ANGLES, BARS, BEAMS
CHANNELS, RIVETS
BOILER TUBES
FLOOR PLATES
TANK FLANGES
STAY BOLTS
SMITH COAL and COKE

Immediate Shipments from Tulsa Stock
PHONE O-1146 OR WRITE BOX 1926.

Tycos
temperature instruments

Tycos mercury-actuated Recording Thermometers, equipped with our extra-heavy separable sockets, for oil still temperatures, are rugged and are noted for accuracy and long-life.

Tycos instruments are in daily use in many of the largest oil refineries and natural gasoline plants in the country and their continuous successful operation insures complete satisfaction to users.

Type B Flow Meter

For Absorption Gasoline Plants

Manometer

Meriam Type B Flow Meters can be installed to indicate the amount of oil being circulated. They can also be installed on each absorber to indicate the volume of gas passing to each unit.

We carry in stock a complete line of Meriam Manometers and Test Meters. "U" Type Manometers sizes 6-inch to 50-inch.

HAYS GAS ANALYZERS AND CO_2 RECORDERS
MERCURY—STOP WATCHES
CENTRIFUGE MACHINES—OIL THIEVES
Complete Stock of Laboratory Apparatus
Put Your Automatic Temperature Control Problems Up to Us

The Fort Worth Laboratories Instrument Dept.
828½ Monroe Street
Phone L. D. 138 FORT WORTH, TEXAS P. O. Box 1008

Walter A. Brown, Los Angeles, for an apparatus for treating oils, embodying a closed tank with inlet and outlet, a supporting frame in the tank, a series of sloping pans supported on the frame, the pans extending longitudinally through the tank arranged one above the other and sloping one in one direction and the next one in the opposite direction and their ends being arranged so that liquid will drop off the low end of one onto the high end of the next lower one so that liquid fed onto the uppermost pan will run back and forth on the several pans; and steam heating coils directly over each pan, said coils embodying longitudinally extending pipes, and the pans being longitudinally troughed to concentrate the liquid beneath in pipes

Distilling Gasoline

No. 1,529,067, granted March 10 to Henry A. Hills, Grand Rapids, Mich., for a process for distilling gasoline containing grease and suspended matter to remove the same, which consists in first passing the gasoline at high speed over a surface heated by the vapors of distillation, subsequently introducing the fluid so heated into the source of vapor distillation, and finally condensing the vapors of distillation.

Converting Hydrocarbons

No. 1,529,095, granted March 10 to Carey W. Thompson, New York, and Henry C. Beeler, Denver, for a process of converting hydrocarbons, which includes the step of commingling a body of hydrocarbon with a moving body of gravel, subjecting said material at atmospheric pressure to heat, independently removing the lightest fractions from the retort, and successively removing the heavier fractions from the body of the mixture undergoing distillation at succesive zones of increasing temperature, commingling said vapors within the vapor space of the retort and returning the fraction condensed within the region of the vapor take-off in the vapor space to the gravel before said gravel reaches the zone of heat treatment.

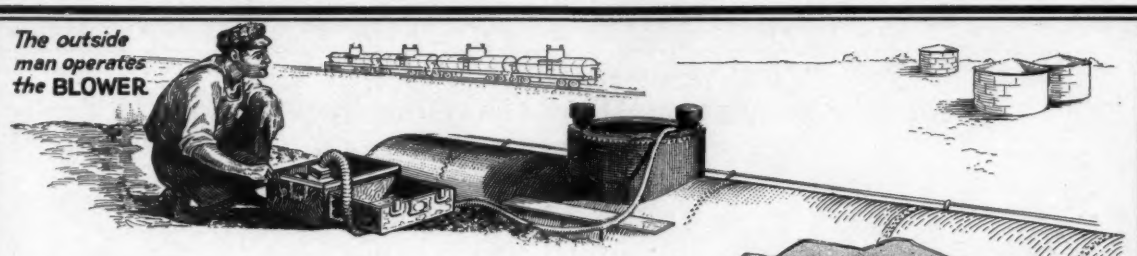
Gas Separator

No. 1,529,162, granted March 10 to Frank D. Bruce, Tulsa, Okla., for a gas separator comprising a supporting frame provided with oppositely disposed bearings, inlet and outlet pipes arranged within said bearings, a tank having oppositely disposed bearings arranged over said pipes, means for counter-balancing said tank, said tank having a discharge pipe at its lower end, a valve carried by the discharge pipe and means for operating said valve when the weight of the fluid in said tank over-balances the counterbalancing means.

Treating Emulsions

No. 1,529,349, granted March 10 to William O. Eddy, Long Beach, Calif.,

(Continued on page 96.)



Feed him
FRESH-COOL-AIR

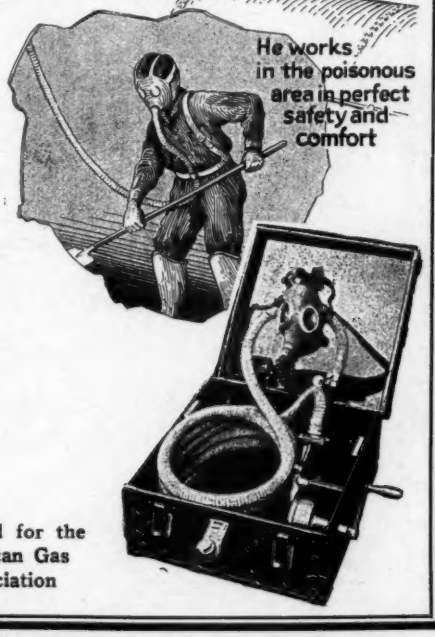
—and he'll work with greater ease, comfort and safety.

The M-S-A Standard
HOSE MASK

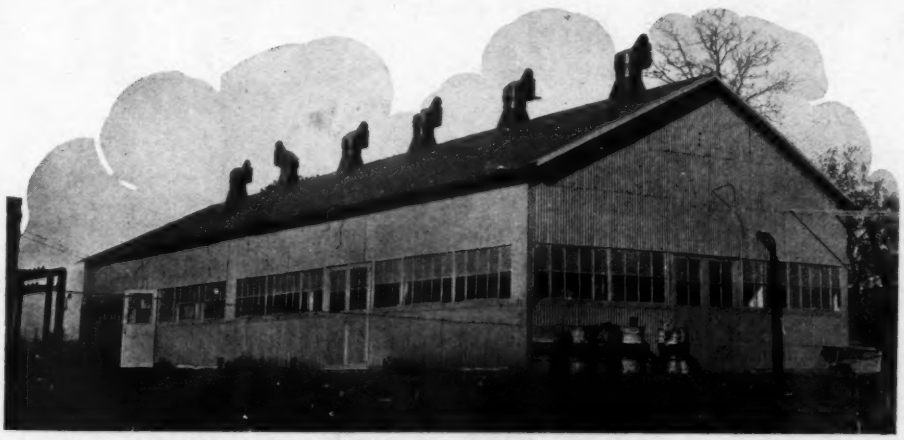
Supplies a continuous stream of fresh air to workers in Tank Cars, Oil Tanks, or in any confined gaseous space.

Send for Bulletin No. 99F for complete information on this and other types of Hose Masks

Mine Safety Appliances Co.
Chamber of Commerce Bldg. Pittsburgh, Pa.



Standard for the American Gas Association



GASOLINE PLANT BUILDINGS

DESIGNED—FABRICATED—ERECTED

Our shops are well equipped to promptly fabricate your requirements

MOSHER STEEL AND MACHINERY COMPANY
DALLAS, TEXAS

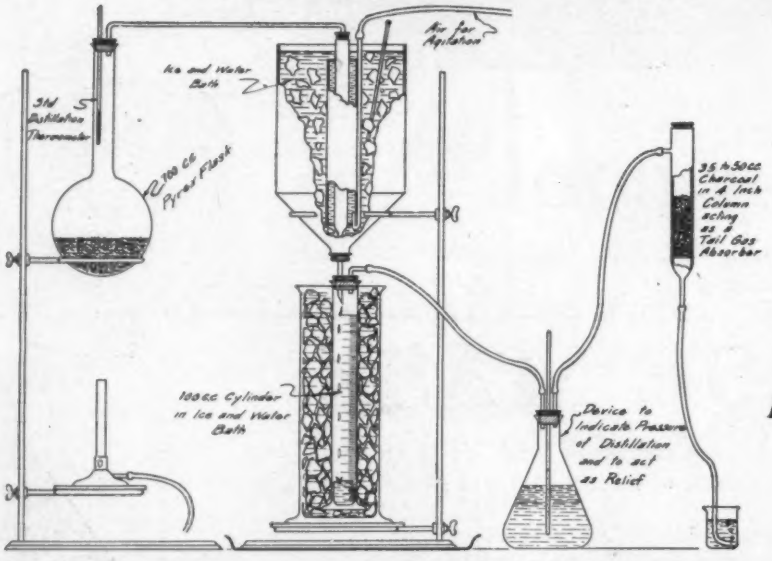
HOUSTON STRUCTURAL STEEL COMPANY
HOUSTON, TEXAS

Tell them where you saw the ad

DELIVERY FROM STOCK

Complete Charcoal Distillation Apparatus

with Tail Gas Absorber


Air for Agitation
Ice and Water Bath
Std Distillation Thermometer
100 cc Pyrex Flask
35 to 50 cc Charcoal in A Inch Column acting as a Tail Gas Absorber
100 cc Cylinder in Ice and Water Bath
Device to Indicate Pressure of Distillation and to act as Relief

Controllers
Recorders
Gages

Pyrex
Glass
Ware

Complete
Line
of
Oil
Testing
Instruments

The Refinery Supply Company

Phone 38851 **Tulsa, Oklahoma** **4th and Detroit**

OIL METERS

Positive displacement, oscillating piston design. Made in all sizes from 5/8" to 6", in both standard and high pressure types. The modern, convenient, and sure apparatus for measuring oils, and liquid oil products.

Accuracy that **lasts** is the outstanding feature of the EMPIRE meter. The oscillating piston design is in a class by itself in this respect.

We will be glad to send you a booklet which describes the mechanism of the EMPIRE in full detail, with clear diagrams of the operation of the oscillating piston. Ask for 110-R.

NATIONAL METER COMPANY

299 Broadway, New York, N. Y.

THE EMPIRE

Tell them where you saw the ad

REFINERY AND GASOLINE PLANT ACTIVITIES

Magnolia Completes Change To Gas Burners at Beaumont

Beaumont, Texas.—The replacement of oil with natural gas for fuel in operating all stills and boilers at Magnolia Petroleum Company's refinery near Beaumont has been pronounced highly satisfactory and economical, and the results obtained by this plant has caused other major companies operating refineries on the Gulf Coast to become greatly interested in the use of natural gas for fuel. Magnolia's refinery is now one of the largest individual consumers of natural gas in the world, since approximately 40,000,000 cubic feet of gas is being burned daily. This gas is credited with saving the company close to 7000 barrels of fuel oil daily which is now available to be run down to coke.

Natural gas is delivered to the Beaumont refinery via 210 miles of welded line from the Cotton Valley and Panola-Waskom gas fields in upper Louisiana and northeast Texas, respectively. This line is owned by the Magnolia Gas Company, a subsidiary of Magnolia Petroleum Company, and gas was first turned into the refinery on the night of December 12, 1924, on a battery of coke stills. The refinery began consuming gas on a large scale on February 1, and has since been operating without interruption.

The conversion of the stills and boilers from oil to gas fuel required many days and considerable work, an entirely new system of fuel lines—aggregating five miles—were necessary at the refinery. Twelve-inch main feed lines were used on the refinery reservation. Approximately 1600 gas burners have been installed, as well as numerous meters, regulators, and any number of miscellaneous appliances necessary for the reception of the gas.

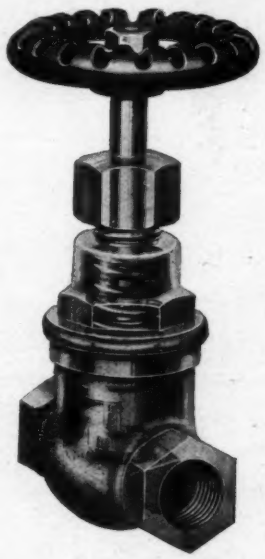
New Catalog Describes Bruce-Macbeth Engines

The Bruce-Macbeth Engine Company of Cleveland, Ohio, with branch office at 209 S. Cincinnati avenue in Tulsa, Oklahoma, and at other points has recently issued a new catalogue of Bruce-Macbeth gas engines for use in the oil industry.

The catalogue is profusely illustrated and is especially neat in appearance. The various advantages of the Bruce-Macbeth engine are discussed and cross-sections of the engines are shown with diagrams reproduced as to cost of operation, saving in fuel and other interesting facts.

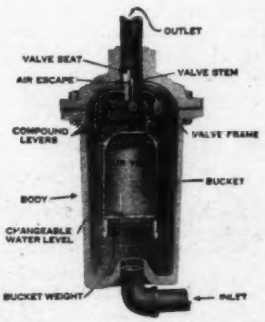
Crandall and Osmond Open Oil Engineering Office

Charles H. Osmond, for the past six years engaged in various technical capacities with The Atlantic Refining Company, has announced his association with Roderic Crandall to form the firm of Crandall and Osmond to engage in practice of general petroleum engineering, specializing in reports on oil companies, domestic and foreign, regarding re-financing, improvements in refining methods, and cracking processes. Mr. Osmond's broad experience as chemical engineer in charge of the study of various processes and particularly during the last two years on the general subject of cracking should prove valuable for this work. Mr. Osmond will be located in the Whitehall Building, 17 Battery Place, New York



Kelly Self-Grinding Valve

Grinds itself each time the valve is opened or closed. Contraction of valve stem after closing is automatically taken up by the spring, hence No Wire Drawing. Dallas Stock.

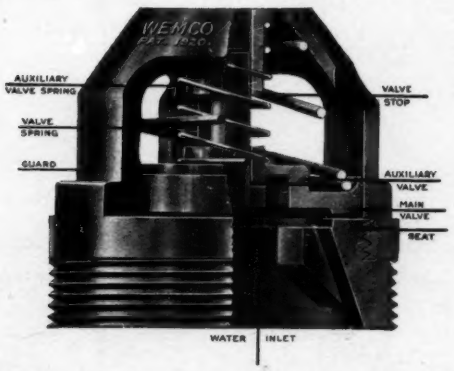


Armstrong Steam Trap

Cannot Waste Steam
Inlet on Bottom, large capacity
Non Air-Binding, small size
Cheap in price. Dallas Stock

"Wemco" Double Pump Valve

For Simplex and Duplex Pumps



Superior to any valve on the market.

All ribs of seat removed, thereby giving full area of opening and reducing friction to a minimum. No studs or parts to break in operation.

Auxiliary valve acts as a cushion and prevents hammering. Pump can be slowed down at least 25% and still give more volume thereby greatly reducing wear and tear on pump and reducing cost of operation. 30% more efficiency guaranteed.

AUTOMATIC BOILER-FEED REGULATOR

Will Reduce Fuel Consumption 2 to 8 Per Cent.

Involute (non-clog) Spray Nozzles.

Mosher Steam Separators.
Seatless Blow-off Valves.
Reducing and Regulating Valves.
Steam Pumps. Steam Strainers.
W. R. CO_2 Recorder.
Superheater for R. T. Boilers.

GEO. B. ALLAN & CO.

Quality Steam Specialties

Deere Building DALLAS, TEXAS

OUR PROCESS

prevents

NEW SCALE FORMING ON WATER JACKETS, BOILER TUBES, CONDENSERS, COOLING UNITS, PUMPS, ETC.

In addition to taking out the scale ALREADY FORMED

The Most EFFICIENT and ECONOMICAL Process on the Market

SATISFACTORY RESULTS GUARANTEED

Write Today for Full Details

WARD CHEMICAL CO.

Atco Bldg. Tulsa, Okla.

White Eagle Increasing Fort Worth Capacity

Fort Worth, Texas.—The White Eagle Oil and Refining Company has started work on the erection of an additional pipe still at its Fort Worth refinery to eliminate unnecessary re-running through its crude stills, while it is also planned to add one steam still to its present battery. Upon the completion of the additional pipe still this plant will have a daily capacity of 5000 barrels.

Transcontinental Makes Plant Improvements

Fort Worth, Texas.—An additional filter house, equipment and tankage is being erected at the Fort Worth refinery of the Transcontinental Oil Company at an expenditure of approximately $75,000 to increase the lube oil production of the plant to 1000 barrels daily. This plant is operating on paraffin base oils obtained by pipe line from the Ranger district. The increased refinery capacity will be in operation by July 1. The compounding and barreling plant is also to be doubled in output.

Plan $300,000 Gasoline Plant Near El Dorado

El Dorado, Arkansas.—The Natural Gas and Petroleum Company of this city is contemplating the erection of a natural gasoline manufacturing plant in the Norphlet section of the Smackover field to handle approximately ten million cubic feet of gas daily. Approximately $300,000 will be spent in completing the plant and gathering lines.

Producers Gasoline Corp. New Plant in Operation

Los Angeles, Calif.—The Producers Gasoline Corporation late in March placed in operation a 6000 gallon natural gasoline absorption plant in the Rosecrans field and the contract has been let to the Southwestern Engineering Company for the erection of a 12,000 gallon plant to be erected at once in the same field. The new type bubble towers, mentioned in the REFINER in a recent issue, are in use.

New York Company Builds Gasoline Plant at Teapot

Casper, Wyo.—The New York Oil Company has purchased control of the Central Pipe Line Company and plans the building of a compression gasoline plant at Teapot in this state. The New York Oil Company recently closed a deal for the purchase of the casinghead gas from the wells on Teapot Dome now being operated by receivers.

The gasoline plant will utilize this gas and is to be constructed in units so as to permit further enlargements if found necessary.

San Francisco. — Jake Berger, who owns six small wells producing about 10 barrels of 70 gravity oil a day in the Half Moon Bay district is operating a very small refinery, selling the gasoline through a garage in the town of Half Moon Bay. The plant is the smallest in the state and is not taken into account by those gathering statistics.

HYDROMETERS

Thermometers

Hydrometer Jars

As specialists in the making of scientific instruments for Refinery use, we have perfected an hydrometer having a thermometer above the gravity scale.

This feature eliminates the removal of the hydrometer for temperature readings.

Any type of thermometer or hydrometer with special range, to order.

A. P. I. Standard

Literature?

THE JAMES BERG MFG. CO.

3707 Twelfth Ave., Brooklyn, New York

Electrically Driven Centrifuges
Hand Centrifuges
WRITE
WILLIAMS, BROWN & EARLE, Inc.
Manufacturers of Laboratory Apparatus
918 Chestnut St. Philadelphia, Pa.

CARBON BLACK
Channels, Angles, Roofing, Burner Pipes, etc. We are specialists in Carbon Black Building Material. Most of the buildings in Monroe, La., gas field and Stephens County, Texas, came from us.
WOODWARD, WIGHT & CO., LTD.
New Orleans, La.

Mettler Entrained Combustion Gas Burners
— FOR ALL —
Purposes, Kinds of Gas, Pressures
LEE B. METTLER CO.
406 S. Main St. Los Angeles, Cal.

Premier Colloid Mill

Cracked Residuum

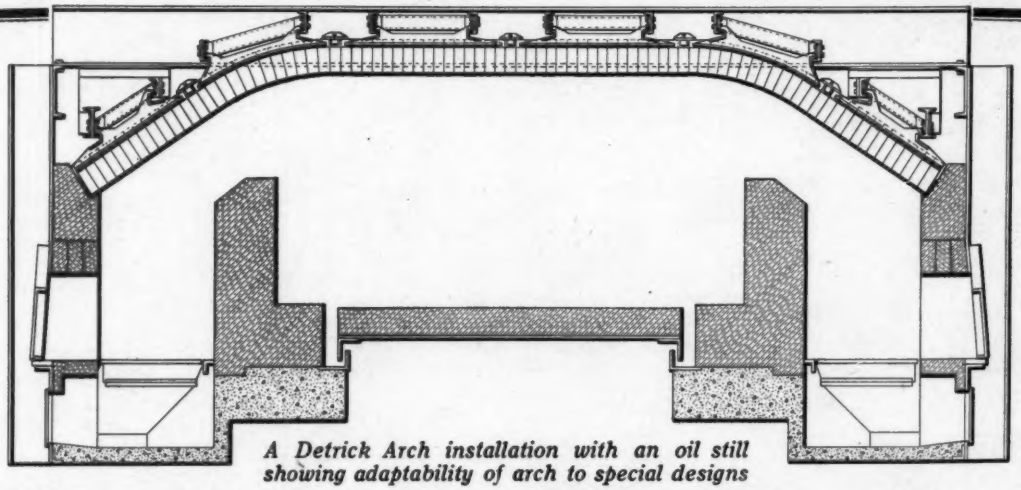
CONVERTED — BY SUSPENSION — INTO COMMERCIAL PRODUCT ASPHALT AND BITUMEN EMULSIONS

Basic United States Patent No. 1,523,632
Basic Canadian Patent No. 244,685

Applications for Process Plants sent upon request. Laboratory tests and demonstrations free of charge.

Premier Mill Corporation Geneva, New York, U.S.A.

For countries other than U. S. and Canada, address Burt Boulton & Haywood, Ltd., Silvertown, London, England



A Detrick Arch installation with an oil still showing adaptability of arch to special designs

Detrick . . . for the oil still—

THE unusual simplicity of the Detrick Arch makes it possible to meet all the conditions required by the oil still.

Here as in every other instance of arch design Detrick points the way. our best reason for choosing a Detrick Arch is the fact that every change in Detrick design has been an improvement. Detrick installations by such concerns as The Texas Co., Gulf Refining Co., Standard Oil Co., Sinclair Oil Co., and Shell Refining Co., are proof that the Detrick Arch meets oil still requirements.

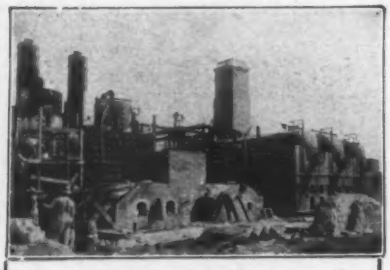
M. H. Detrick Co., 140 S. Dearborn St., Chicago

Branches in principal cities

DETRICK *Flat Suspended* **ARCHES**

R&NGM 4-8-RTG

Tell them where you saw the ad



An Authority on Oil Still Construction Says:—

"High temperature cement has to a great extent taken the place of fire clay in recent years, especially where extremely high temperatures are required. This cement is applied between the brick in the form of a paste and a thin layer is spread over the face of the brick. After the furnace has been fired, this cement unites the brick into a solid wall, and forms a glazed surface over the brick, thereby protecting the brick from disintegrating under the extreme heat."

Many Oil Producing and Refining Companies are using

HYTEMPITE

(Reg. U. S. Pat. Off.)

For

1. **Laying Fire Brick.**
2. **Patching Furnaces.**
3. **Making one-piece Baffles.**
4. **Making Special Shapes and Tile.**

because HYTEMPITE bonds at normal room temperatures and the bond extends through the entire thickness of wall or arch.

400 pounds will lay 1000 brick

HYTEMPITE is warehoused at or near all oil fields and industrial centers for immediate delivery.

Instruction booklet HO-109 on request.

QUIGLEY

Furnace Specialties Co.,

INCORPORATED

26 Cortlandt St. New York

Montana Company Plans Refinery at Shelby

Great Falls, Montana.—The Shelby Pipe Line and Refining Company has been organized under the laws of Montana and contemplate the construction of a refinery at Shelby. The authorized capital is $350,000 and the incorporators are J. A. Johnson, president; L. Wrather, first vice president; C. Walburger, second vice president, and James W. Johnson, secretary and treasurer.

The refinery will be modern in construction and design and will be built in units, the first unit of which will have a rated capacity o fabout 1000 barrels. The plant will operate on crude from the Kevin-Sunburst field.

Automatic Valve For Scrubber Tank Discharge

An automatic valve for discharge of sludge from scrubber tanks at natural gasoline plants has been invented by B. E. Downton of Dewey, Oklahoma. It is manufactured and sold by the Nu-Way Valve Company of that place.

The device and its operation are described by the inventor below:

F is a special valve through which fluid enters trap chamber from gas lines, or scrubber tanks. B is residue gas inlet valve to trap chamber. A is fluid discharge valve to atmosphere. C is fulcrum bearing for trapping device which gives positive action either up or down, being actuated by float arm, D is ⅛-inch hole through valve disc, and E shows shut off gate valve to be inserted. The operation is as follows:

With float in lowest position, valves A and B are in closed position, and valve F is open. A vacuum now being established in trap chamber, fluid will enter, as fluid level rises valves A and B are eventually knocked open by tripping device. Valve F automatically closes and vacuum is broken in trap chamber. Residue gas enters valve B, and forces fluid out of valve A. As fluid level drops, valves are eventually knocked closed by tripping device. Vacuum is now re-established in trap chamber through hole D in valve F. Valve F will then automatically open and allow more fluid to enter trap chamber and cycle is repeated as long as there is fluid to be received. All parts inside of trap chamber are of brass or bronze, and are removed as a unit with end plate. Trap chamber is made of 12-inch pipe.

Los Angeles.—The Devil's Den Oil Products Company is building a small experimental refinery at San Diego in this state to extract ichtyol from the oil produced by the few wells at Devil's Den. The company was financed by citizens of San Diego.

Tycos

temperature instruments in the oil industry

CRUDE OIL STORAGE TANKS
PUMPING LINES
- Pump Stations
- Pipe Lines

STEAM POWER PLANTS
- Feed Water
- Condensers
- Economizers
- Superheated Steam
- Flue Gas
- Blow-Offs
- Combustion Chamber
- Main Steam Lines
  - *Saturated Steam*
  - *Stokers, Draft Fans and Dampers*

DISTILLATION APPLICATIONS
- Coal, Oil and Gas—
- Fired Stills and Vapor Lines
  - *Combustion-Chamber, Still-Setting and Stack*
- Tar Stills and Vapor Lines
- Steam Stills and Vapor Lines
- Pressure Stills
- Condensate Lines in Tail House
- Run-Down Tanks

ACID TREATMENT
- Acid Plant

CAUSTIC-SODA PLANTS
FILTER PLANT
- Heating Oil from Tanks into Filter
- Hot Filter Room
- Regenerating Kilns

WAX PLANT
- Refrigeration
  - (a) Ammonia Compressors
  - (b) Brine Lines
  - (c) Ammonia-Condenser Lines
  - (d) Chilling Coils in Oil Line and Brine Line.
- Press Room
  - *For the Wall*
  - *Outside Observation of Press-Room Temperature*
  - *Oil Line to Press*
- Oil heaters to Wax Sweating Room
- Wax Sweaters
- Slack-Wax Storage Tanks
- Wax-Scaling Machine

CAN FACTORY
- Solder Bath

BARREL PLANT
- Dry Kiln
- Hot-Glue Line
- Glue Kettles
- Air Heaters

GREASE PLANT
- Grease Kettles

TANK CARS
PUMP AND DOCK STATIONS
- Electric-Driven Pumps
- Steam-Driven Pumps

LABORATORY
- *CASINGHEAD, or GAS, GASOLINE*

COMPRESSION PLANTS
- Compressor

REFRIGERATION PLANT
- (a) Ammonia Compressors
- (b) Brine Lines
- (c) Ammonia-Condenser Lines
- (d) Oil-Chilling Coils

ABSORPTION PLANT
- Still and Vapor Lines

PRE-HEATERS
HEAT EXCHANGERS
CONDENSER AND KNOCKOUT BOX
- Oil and Gasoline Temperatures

WATER COOLING APPARATUS
- Water Supply Line

LABORATORY

Request Catalog part 1700-*Tycos* for the oil industry.

Taylor Instrument Companies

Rochester, N. Y.

Canadian Plant, *Tycos Bldg., Toronto*

There is a *Tycos* or *Taylor* Instrument for every purpose.

Mid-Continent Refineries Are Running Less Oil

Tulsa, Okla.—Mid-Continent refinery runs for April 1 was 6150 barrels less than the runs on the first day of the previous month. From a compilation of individual refinery runs the total shows that the output for April was 378,850 barrels, compared to a total of 385,000 barrels on March 1.

The refined oil market is possibly responsible for the decrease shown in this total. However, North Louisiana and Arkansas show an increase in runs to stills. The increase in Arkansas is unusual in the fact that it is the seat of the present overproduction of crude oil and the one soft spot in the refined market. North Louisiana should also be affected by the over production of the sister state.

Following is a comparative table of the runs for April 1:

Oklahoma—	
April 1	172,000
March 1	177,000
Decrease	5000
Kansas—	
April 1	64,100
March 1	66,900
Decrease	2,800
North Texas—	
April 1	88,150
March 1	90,000
Decrease	1,850
North Louisiana—	
April 1	28,450
March 1	26,100
Increase	2,350
Arkansas—	
April 1	14,150
March 1	13,000
Increase	1,150
Standard Oil Co. (Neodosha)	12,000
Total April 1	378,850
Total March 1	385,000
Decrease	6,150

From this table it can be seen that the loss in Oklahoma is the prime factor in the loss of the total of the entire area. And the Oklahoma loss is accredited to the reduction of daily runs of approximately 5000 barrels by the Champlin Oil and Refining Company at Enid.

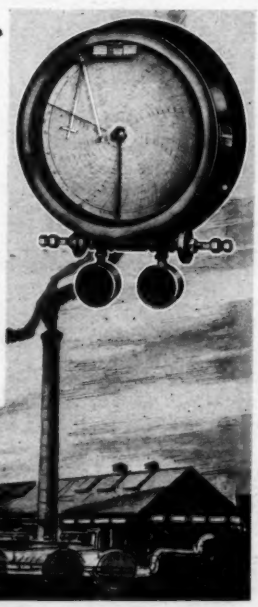
The decrease in North Texas is caused by the shutting down of five small plants which were showing on the March 1 report but which were shut down on the first day of the current month. The largest of the plants shut down in North Texas was that of the Transcontinental Oil Company at Fort Worth which has a daily capacity of 5000 barrels and which was running approximately 2000 barrels before shutting down.

for accurate control of cracking units

Use Foxboro Automatic Temperature Controllers on dephlegmator towers and yield increases, reruns are eliminated, fractions are closer cut. Foxboro accurate temperature control is a recognized necessity. This is the experience of many of the largest refineries in the country.

Foxboro Temperature Controllers can be adapted to any type of equipment. The bulb of one Foxboro Controller installed on a dephlegmator tower of the Marland Refining Co., Ponca City, is located at the top of the tower—seventy feet above the instrument.

Foxboro Automatic Temperature Recorder Controller



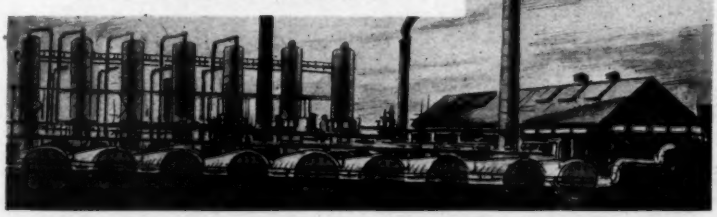
Get in touch with our Tulsa office, or write for Bulletin RN 113-1.

THE FOXBORO CO., Inc.

Neponset Avenue, Foxboro, Mass., U. S. A.
213 South Cincinnati Ave., Tulsa, Okla.

New York, Chicago, Boston, Philadelphia, Pittsburgh, Cleveland Rochester, Birmingham, Los Angeles, San Francisco, Portland, Ore.

FOXBORO
REG. U. S. PAT. OFF.
THE COMPASS OF INDUSTRY



Wilson-Snyder
Hot Oil Pumps

Unless your Cracking Equipment includes a Hot Oil Pump, your gasoline yield will be much less than it should be —over 72 installations are proof of this fact.

WILSON-SNYDER
PITTSBURGH, PA. U. S. A.

8000-Gallon Tank Car

GATX GENERAL AMERICAN

Make Tank Car Reservations Now

THE busiest period of the year is approaching. Activity in the motor field and the enormous demand for oils and asphalt for road building, will soon require every available car we have for leasing. We have increased our fleets of cars for leasing to 15,000. Wise refiners are placing their contracts now for future requirements.

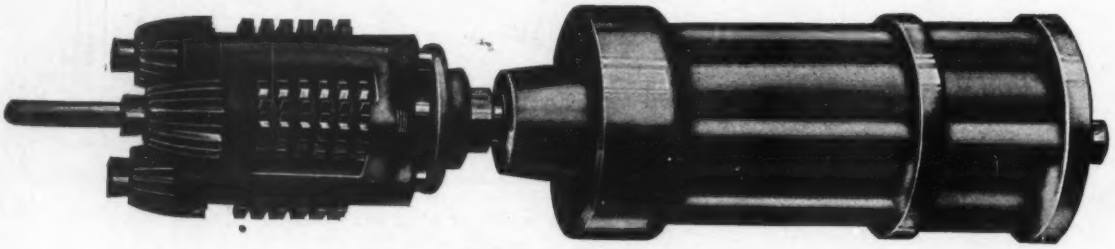
Get your repairing and reconditioning done before the busiest season starts. Order your new cars at once. In thirty days the capacity of all our plants will be taxed to close to its limits. So act at once.

GENERAL AMERICAN TANK CAR CORPORATION

General Offices: ILLINOIS MERCHANTS BANK BUILDING, Chicago, Ill.

Eastern Office	Mid-Continent Office	Pacific Coast Offices	
17 Battery Place	502 Cosden Bldg.	Rialto Bldg.	Pacific Finance Bldg.
NEW YORK	TULSA, OKLA.	SAN FRANCISCO, CAL.	LOS ANGELES, CAL.

POWER and DURABILITY are Necessary in Cleaners for Cracking Still Tubes



ROTO TUBE CLEANERS

Direct Inquiries to

The Roto Company
HARTFORD, CONN.

Long Beach.—The large Shell Company natural gasoline plant at Signal Hill, which was damaged considerably by a fire last month, is being rebuilt, but will have a smaller capacity, as the old plant was too large for the gas obtainable in the field as the wells grew older. The charcoal process is being used.

Charcoal Process Company Adds New Sales Offices

Charleston, West Virginia, March 19.—Increasing popularity of the Charcoal Absorption Process of natural gas oline extraction and the increasing number of plants now being built in all of the principal fields of the United States except Wyoming, have made it necessary for the Gasoline Recovery Corporation of Charleston, West Virginia, patentee of the process, to establish two new sales and service offices—one in the Mid-Continent field and the other in the California field—in order to better serve their licensees.

V. C. Canter, who has been identified with the development of the Charcoal Process since almost its inception, has been appointed manager of the Mid-Continent office, which is located in the Wright Building, Tulsa, Oklahoma. Before engaging in the research and experimental work of the Charcoal Absorption Process, Mr. Canter took an active part in the Chemical Warfare Department at the American University Experiment Station, Washington, in which division was developed most successfully ways and means for handling poison gases during the war.

In charge of the California office at Los Angeles is Richard C. (Dick) Alden, formerly associated with the Chestnut and Smith Company and more recently with the Landreth Gasoline Company as superintendent.

Mr. Alden is a graduate of Lehigh University and has been active in the natural gasoline industry for more than ten years.

Magnolia Doubling Corsicana Refinery

Corsicana, Texas.—Materials are being purchased by the Magnolia Petroleum Company to increase the capacity of its refinery near Corsicana from 3000 barrels to a daily output of 6000 barrels. Three high pressure stills will be included in the new equipment for the plant, and construction work will be rushed in order to have the increased capacity available at the opening of the summer gasoline season. This plant is served by Magnolia's trunk line system from Oklahoma and North Texas fields, and also has access to crude from the Corsicana-Mexia district.

A COMPLETE SERVICE IN
"John Crane"
FLEXIBLE METALLIC PACKING

Runs Cool
(without friction)
Handling:
Gasoline, Naphtha
Benzol

On centrifugal pumps handling crude, gasoline and distillate liquids, "JOHN CRANE" Style 110 is giving long, satisfactory service. In one instance recently disclosed "JOHN CRANE" Packing held for eight years.

Soft babbitt foil is wound over a braided asbestos core. The asbestos supplies ample resilience. The babbitt is smooth running—practically without friction.

Sizes up to 1¼-inch, 10-foot coils.

Write for suggestions on ALL your packing problems. Stocked as follows:

CRANE PACKING COMPANY

Casper Supply Co., Casper
W. H. Steigerwald Co., 617 Washington St., Houston
217 Water Street, Pittsburgh
1808 Cuyler Avenue, Chicago

Pacific Mill & Supply Co., 310 E. Third St., Los Angeles, and 616 Mission St., San Francisco

Silumite Products Corporation

Manufacturers of
Silumite Protective Paint for Iron and Steel
Works—Morton, Delaware Co., Penna.

FOR ECONOMY AND EFFICIENCY USE SILUMITE PIGMENT IN YOUR ALUMINUM PAINT (Formula furnished on request)

What is Your Loss per Year by Corrosion?

On
Underside of roof of agitators.
Inside light oil tanks.
Pressure stills and smoke stacks.
Air condensers.
Galvanized iron.
Outside storage tanks.
Coal tressels and iron work generally.

Silumite can eliminate this loss in your plants. We are meeting these conditions in some of the largest and most conservative companies in your industry.

FULTON DUPLEX
SENSITIVE VACUUM REGULATOR

On a system discharging gases to a line, under light vacuum, it is sometimes desirable to maintain atmospheric pressure.

For this purpose, we manufacture the DUPLEX VACUUM REGULATOR, which acts as a safeguard when used on the vapor lines connected to storage tanks, for the recovery of the gases, the purpose being to prevent the pulling of a vacuum.

WRITE US FOR FURTHER INFORMATION

CHAPLIN-FULTON MFG. CO.
28-36 Penn Ave., Pittsburgh, Pa.

Our Aim
To Give Our Patrons the Best Service Possible

We can supply you with Cardwell and Miner draft gear parts. We will also furnish you with safety valves and outlet caps on authority of defect cards.

Lone Star Tank Car Company

Wichita Falls, Texas.
P. O. Box 1445
Telephone 9157

Fort Worth, Texas
P. O. Box 754
Tel. Lamar 5466

Pure Adds Centrifugal Cold Settling Plant

(Continued from page 25.)

the wax from the oil, making possible the production of a stiff oil free wax.

In addition, by utilizing hot water as a carrier liquid, the wax is melted as rapidly as it is discharged from the machine, that it may flow by gravity to the wax rundown separator where the water and wax are separated by gravity. The water flows automatically to the hot water carrier liquid tank from which it is pumped back through the system and re-used. The dehydrated wax flows to the wax free oil run down tank from which it is pumped to storage.

Better Product

In handling its cylinder stock in this manner the company will not only increase the price of its regular grade of Cabin Creek stock, but it will be enabled to furnish a motor oil with a much better color and a considerably lower pour test than was possible with the old Tiolene Motor oil prior to adopting this process. Heretofore a cylinder stock having a pour of 50 and 8 plus color has been used, whereas under the present arrangement a bright stock having a pour test of 20 or better and a six color is available for the production of the new Tiolene Motor Oils.

The wax flux which appeared in the old motor oils when subjected to extremely low temperatures has been eliminated. Because of its light color, Cabin Creek crude oil is particularly adapted to the manufacture of bright stocks. The residual stock requires no acid treating, the desired color being attained by filtering alone. The filtering to color and the removal of amorphous wax is all that is necessary to transform the cylinder stock to a valuable bright stock.

Foxboro Moves Tulsa Office to New Location

Tulsa, Okla.—Due to the company's increasing business in the Mid-Continent territory, the Foxboro Company, Inc., is moving from their present location at 213 South Cincinnati Avenue in Tulsa to more commodious quarters at 205 South Cheyenne street.

The new location affords a modern office building of three stories that will be occupied entirely by the company. The Foxboro Company are manufacturers of meters and other recording and temperature equipment for the oil industry and maintain at the Tulsa offices a complete stock of their products as well as operating a repair shop for reconditioning all their equipment.

The Mid-Continent offices of the company which has headquarters and works at Foxboro, Massachusetts, is in charge of Willis C. Brown of Tulsa, who also gives personal supervision to the repair work.

Louisiana Subsidiary to Handle Sinclair Exports

Dallas, Texas.—The buying office maintained in the Magnolia building in Dallas by the Sinclair Refining Company to purchase refined products from refiners in Oklahoma, Texas and Louisiana for export delivery has been entirely separated from the domestic interests of the Sinclair Refining Company effective April 1, and in the future will be known as the Sinclair Refining Company of Louisiana, Inc. However, both concerns are subsidiaries of the Sinclair Consolidated Oil Corporation.

The Louisiana subsidiary has been the export branch of the Sinclair Interests for a number of years, with a topping plant at Mereaux, La., and a complete tank farm, compounding plant and water terminal at Westwego, La. The designation of the name of the Dallas buying office as being a branch of the Sinclair Refining Company of Louisiana, Inc., will not affect its personnel or policy, but will place the buying and shipping of all refined products for export delivery in the name of the Louisiana subsidiary.

Fort Worth, Texas.—Headquarters maintained in Fort Worth by W. O. Stowell, manager of the natural gasoline production division of the Humble Oil and Refining Company, were removed to Houston on the first of April.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912,

Of The REFINER & NATURAL GASOLINE MANUFACTURER, published monthly at Houston, Texas for April 1st, 1925.

STATE OF TEXAS,
COUNTY OF HARRIS, ss.

Before me, a Notary Public, in and for the State and county aforesaid, personally appeared A. L. Burns, who, having been duly sworn according to law, deposes and says that he is the General Manager of the REFINER & NATURAL GASOLINE MANUFACTURER, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

President and publisher, R. L. Dudley, 1716 Dallas Avenue, Houston, Texas.

Editor, Spencer W. Robinson, 1716 Dallas Avenue, Houston, Texas.

General Manager, A. L. Burns, 1716 Dallas Avenue, Houston, Texas.

2. That the publication is owned by The Gulf Publishing Company, a corporation, and the names and addresses of the stockholders owning or holding one per cent or more of the total amount of stock are as follows:

Jas. Anderson, Houston, Texas; R. L. Blaffer, Houston, Texas; Mrs. S. C. Blaffer, Houston, Texas; A. L. Burns, Houston, Texas; J. F. Carter, Jr., Tulsa, Okla.; R. E. Connell, Houston, Texas; H. W. Draper, Houston, Texas; Dr. N. L. Dudley, Goose, Creek, Texas; R. L. Dudley, Houston, Texas; W. S. Farish, Houston, Texas; D. H. Freel, Casper, Wyo.; H. H. Gill, New York, N. Y.; Dr. J. L. Gross, Houston, Texas; Howard R. Hughes Estate, Houston, Texas; Chas. H. Lane, Houston, Texas; W. B. Larkin, Wichita Falls, Texas; J. H. McEvoy, Houston, Texas; J. H. McEvoy, Jr., Houston, Texas; H. A. Miles, Dallas, Texas; Mrs. J. B. Moore, Houston, Texas; Wallace E. Pratt, Houston, Texas; J. Kent Ridley, Houston, Texas; Spencer W. Robinson, Houston, Texas; C. N. Scott, Houston, Texas; R. S. Sterling, Houston, Texas; Jno. R. Suman, Houston, Texas; Wm. A. Vinson, Houston, Texas; Bud Waller, Chicago, Ill.; C. F. Williams, Humble, Texas; E. E. Watts, Houston, Texas.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are:

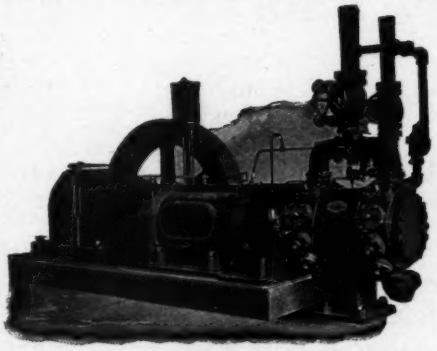
H. C. Weiss, Houston, Texas; Jas. Anderson, Houston, Texas; Howard R. Hughes Estate, Houston, Texas; R. L. Blaffer, Houston, Texas; W. S. Farish, Houston, Texas; Chas. H. Lane, Houston, Texas; John Hamman, Houston, Texas; R. S. Sterling, Houston, Texas; Maurice Hirsch, Houston, Texas.

A. L. BURNS, General Manager.

Sworn to and subscribed before me this 2nd day of April, 1925.

MAURICE HIRSCH, Notary Public.

Vilter Ammonia Compressors Fittings and Pipe Coils
Render Years of Reliable Service



Compressors built in several types and a great variety of sizes. Illustration is of a high speed type compressor.

Complete Data on Request

THE VILTER MFG. CO.
Established 1867
1152-1162 Clinton St. Milwaukee, Wis.

BRANCH OFFICE
413 Com'l Bank Bldg.
Houston, Texas

WAIT!

Unless you investigate "United" before buying refining equipment, you do yourself an injustice.

Send Us Your Inquiries for
Tankage, Stills, Towers, Fittings, Castings, Forgings

"United" Equipment and supplies are designed right, built right. They will give you maximum, satisfactory service. And ALWAYS the first cost is right. We can supply Anything and Everything in Refinery Equipment. Tell us your needs.

UNITED IRON WORKS, Inc.
Kansas City, Mo.
Tulsa Dallas

EDWARDS FORGED STEEL VALVES
FRAMANCO FITTINGS

Plug Type Seat and Disc

Minimum Sectional Area, 100% of Pipe Area. For Working Pressures up to 500 lbs., 1100° Fahrenheit.

We eliminate worries account of delayed factory shipments. All sizes of forged steel valves and fittings carried in stock to take care of your immediate requirements.

Maintenance Engineering Corporation
614 Second National Bank Bldg.
HOUSTON, TEXAS

Recent Refining Patents Issued

(Continued from page 84.)

for a process of treating an emulsion of oil and water which consists in adding to the emulsion a modifying agent adapted to change the interfacial tension of the constituents of the emulsion, subjecting the emulsion containing such modifying agent to the action of an electrical field to effect coalescence of the water globules and then subjecting the liquid to a separating action to separate the oil and water constituents thereof.

Refining Oil

No. 1,529,504, granted March 10 to William J. Reilly, Denver, for an apparatus for refining oil, consisting of a furnace, an oil containing device consisting of three oil drums connected by tube banks to form a triangle with its apex at the bottom, said furnace having a passageway leading therefrom, one tube bank being located towards the front of the furnace and in the passageway from the furnace, another of the said tube banks being located to the rear of the furnace and protected by means of a baffle wall located between the tubes and the furnace, a vaporizing drum located above the upper two oil drums aforesaid and having each end connected to separate one of the oil drums, horizontally inclined vaporizing surfaces in said vaporizing drum, means for elevating heated oil from one of the oil drums to the upper part of the uppermost vaporizing surface, means to return the unvaporized part of said oil to the other oil drum and means for conducting the liberated vapors from said vaporizing drum.

Getting Oil From Rock

No. 1,529,505, granted March 10 to William J. Reilly, Denver, for an apparatus for the separation and recovery of oil from oil-bearing rock material, and the removal of the light oils therefrom, comprising in combination, a still, a longitudinally rotatable agitator element therein, a heating chamber attached to one end of said still, a plurality of separators connected to the other end thereof by means of a tubular member, a downwardly inclined passageway from said tubular member to said heating chamber, and means for introducing the material to be acted upon into said still.

Treating Waste Products

No. 1,529,688, granted March 17 to Artis C. Campbell, Bristow, Okla., for an apparatus for treatment of waste products of crude oil including a drum having an apertured periphery, a head communicating with the top of the drum, a base communicating with the bottom of the drum, said head having apertures in the bottom portion thereof and said base having apertures in the top portion thereof, the apertures in the head constituting means for directing jets of fluid downwardly along diverging lines and the apertures in the base constituting means for directing jets of fluid upwardly along diverging lines, and means for supplying fluid under pressure to the head and base.

Separating Oil From Water

No. 1,530,077, granted March 17 to George P. Haynes, New York, assignor to Todd Shipyards Corporation of New York, for an apparatus for separating oil from water, consisting of a casing having means for the introduction thereinto, at one end, of mingled oil and water, and outlet extending upwardly from said casing base, near its opposite end, to establish the normal liquid level, oil receiving, inclined baffle means located below the normal liquid level, and oil discharge means disposed near the lower portion of said baffle means.

Oil and Water Separator

No. 1,530,078, granted March 17, to George P. Haynes, New York, assignor to Todd Oil Burner & Engineering Corporation of New York, for oil and water separating means, which comprises a series of closed compartments having communicating means, a supply compartment having reception means for the mixed liquid, an inclined baffle located in said supply compartment, to entrap oil thereunder, discharge means for the entrapped oil, near the peak of the baffle, and a delivery compartment having discharge means, means for establishing a liquid head in the apparatus, the closed com-

Because of 1925 Indications It Is Wise to

Make Leasing Arrangements Now

1925, according to all indications, is to be a big shipping year. That means big demands on rolling stock.

By making leasing arrangements now, you assure yourself of the facilities needed to take care of your requirements.

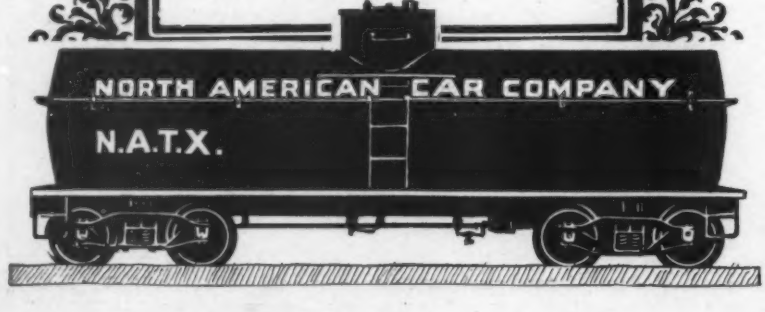
North American, as always, is at your service.

If you OWN cars, now is the time to get them in shape. Our 3 big repair shops are at your service.

NORTH AMERICAN CAR CO.

327 S. LaSalle St., Chicago, Ill.

Southwest District Office: Petroleum Bldg., Tulsa



partments serving to pocket oil rising therein to be subjected to the head pressure, the communicating means permitting the separated water to flow to the successive compartments for discharge from the delivery compartment, and controlled means for discharging the pocketed oil.

No. 1,530,087, granted March 17 to Wm. J. MacArthur, Los Angeles, assignor of one-half to Rea E. Maynard, Los Angeles, for an oil and water separator consisting of means for confining liquid materials, and a wall in the lower part of said means having openings therethrough, disposed obliquely with respect to vertical, of such width that aqueous fluids will pass therethrough, but through which oleaginous fluids will not pass.

Continuous Cracking

No. 1,530,091, granted March 17 to Charles F. Richey and Paul Y. Duffee, Franklin, Pa., assignors to W. J. Duffee, trustee, Franklin, Pa., for a method of continuously cracking and distilling oil consisting in passing the oil in a stream of restricted cross section at a constant rate of flow through a heating zone, heating it therein to a cracking temperature and under a pressure sufficient to maintain the oil in liquid phase at the temperature employed, immediately passing such heated oil in heat exchanging relation with fresh oil entering the heating zone, thereafter immediately passing such oil through a cooling zone to reduce the temperature thereof to normal, maintaining the said constant rate of flow in all of these steps, reducing to normal pressure the cooled cracked oil, and immediately reheating such cooled cracked oil under normal pressure by means of the heated oil being cooled in said cooling zone to accomplish distillation thereof.

Cracking Hydrocarbons

No. 1,530,587, granted March 24 to Henry Clay Wade, New York, for a method of cracking hydrocarbon oils which consists in subjecting water to a temperature exceeding 212° F. within a closed container while the water is confined to prevent its free vaporization, and thence leading the superheated water into a chamber where it is permitted to vaporize by sudden and explosive action, flowing the hydrocarbon oil into said chamber with the inflowing superheated water, so that the hydrocarbon liquid is subjected to the explosive action created by the sudden free expansion of the water into steam, and thence leading the vapors through a cracking coil, the water and oil being introduced into the cracking coil at the same point.

Treating Hydrocarbons

No. 1,530,627, granted March 24 to Carey W. Thompson and Henry C. Beeler, Denver, for a process of treating liquid hydrocarbons which comprises the steps of subjecting a mixture of liquid hydrocarbons and an inert carrier to successive zones of increasing temperature, independently removing the lightest portion, independently re-fluxing within the heating zones the vapors formed at the successive zones of heating, and combining the uncondensed vapors and further cooling said vapors and returning the condensate so formed to the said mixture.

Refining Hydrocarbon Oils

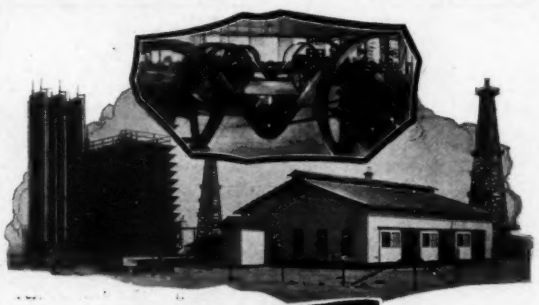
No. 1,531,074, granted March 24 to William E. Chenot, Bellville, Ill., for an apparatus for refining crude hydrocarbon oils comprising a still body to contain the crude oil and having means for heating it, the body having an upwardly extending purifying chamber rising vertically therefrom and opening directly into the still body, the purifying chamber being practically of uniform diameter from its top to its bottom and having its interior entirely unobstructed, said chamber having a capacity not less than one-half that of the body and having a plurality of upwardly and outwardly disposed extensions, each disposed at different heights, each extension being inclined to the horizontal whereby to cause each extension to act in part as a condenser.

Oil Refining Leading Industry in California

Washington, D. C.—Petroleum refining is California's leading industry, according to figures just compiled by the census bureau, the value of production in that industry in 1923 being $267,382,871, or about $118,000,000 more than the production of canned and preserved fruits and vegetables, the second most important industry. The value of refinery products in 1921 was $258,746,383.

Forty-eight establishments were engaged in the refinery industry in 1923, an increase of three over 1921, an average of 7106 workers being employed, as compared with 5524 two years previous. The total wage payments for 1923 were $12,576,168, as compared with $10,768,098 in 1921.

Los Angeles. — The Sentinel Oil Company has placed in operation a small portable natural gasoline absorption plant in the Athens district of the Rosecrans field. The plant was hauled to location on a truck and will produce around 2000 gallons of natural gasoline daily. The plant was built and erected by the Southwestern Engineering Company.



Compressor Plants
Absorption Plants
Cooling Towers
Heavy Construction
Reinforced Concrete Veneer (Patented)

FLUOR Construction

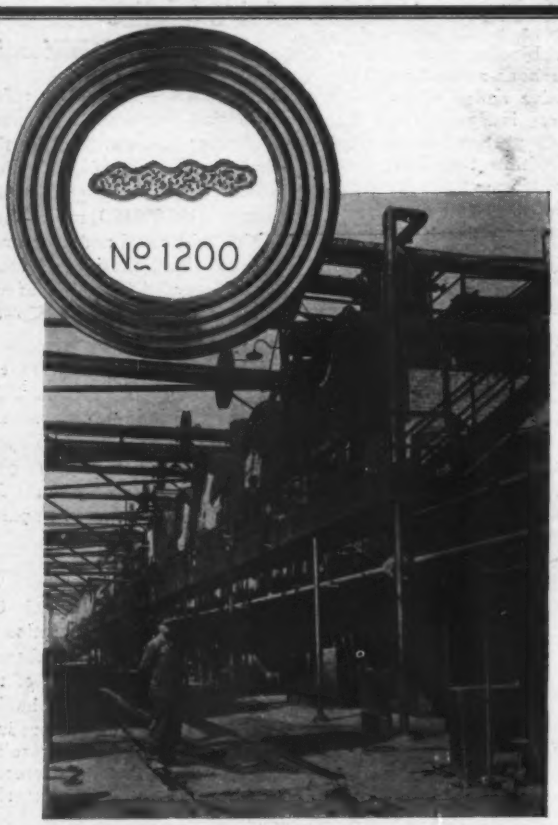
Fluor Construction is today's answer to today's demand for efficient, economical, reliable operation of compressor and absorption plants in refinery service. It embraces advanced design, modern equipment, and master workmanship by an organization of competent engineers whose highly specialized effort has been intensively applied to make Fluor Plants outstandingly superior in a practical way.

Fluor engineers will plan design and build your plants complete, bringing to your aid specialized experience of long standing and the ability of unquestioned authority.

Fluor Construction Company

Construction Engineers

Los Angeles Santa Ana



GOETZE METAL ASBESTOS GASKETS

Withstand oil at high temperature and high pressure. Goetze Gaskets give efficient service insuring against leakage and fire risks.

Goetze Gasket & Packing Co.

28 Allen Avenue
NEW BRUNSWICK, NEW JERSEY

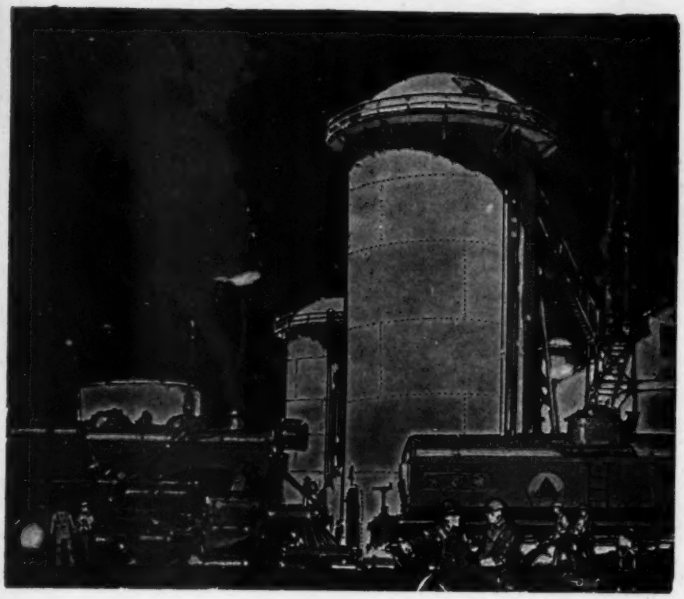
Akin Gasoline Company

MARKETERS OF ALL GRADES OF NATURAL GASOLINE

SWIFT SHIPMENTS FROM TEXAS, OKLAHOMA AND LOUISIANA

WIRE US YOUR ORDERS

Exchange National Bank Building — Tulsa, Oklahoma



Will You Give Entrance Again this Year to The Three Metal Marauders?

"Just Any Paint" is the Pass Key to Rust, Decay *and* Depreciation

A Special Paint for Every Purpose in the Oil Industry

Write today for this valuable, instructive booklet. It specifies what paint to use in each instance. It contains color suggestions and notes on proper application.

Write for it Today!

IT'S economy to buy the specialized paint products of a paint manufacturing concern which has devoted years of study and investigation to the needs of the oil industry. There's a Cook paint for every special need—and at a fair price which means real economy through continued service and durability.

The Cook paints for the oil industry give certain protection against the Three Metal Marauders—Rust, Decay and Depreciation. They prove insurance against vibration, expansion and contraction and abrasion. Estimate for yourself, the value and economy of such a paint service.

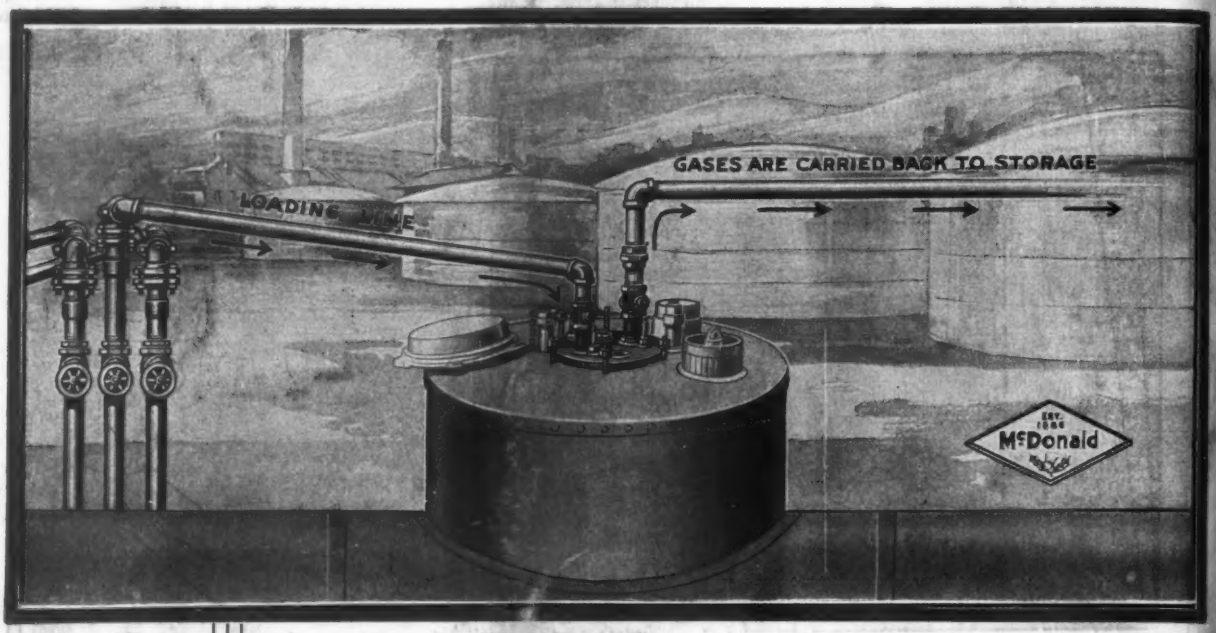
With bettered conditions in the oil industry, now is the time for the rejuvenation of equipment. And the rejuvenation period is not one for expensive experiments with paints of unknown wearing qualities.

There's a dependable guide awaiting you in the FREE booklet, "Cook's Paints for the Refining Industry."

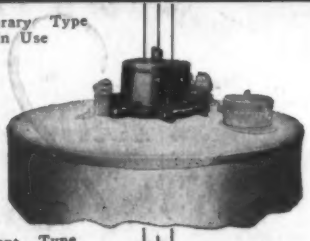
Cook Paint & Varnish Co.

KANSAS CITY, MO.

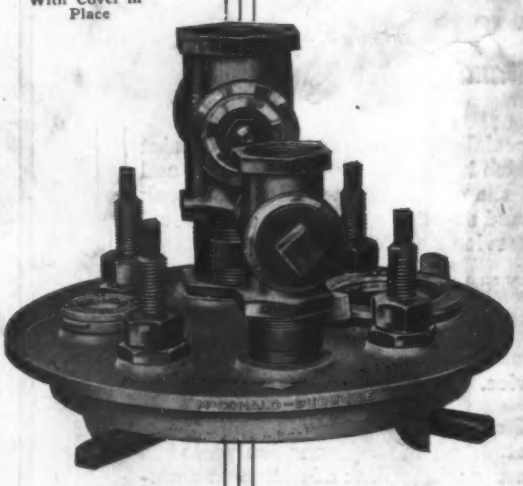
Branches—Oklahoma City, Tulsa, Fort Worth, Denver, Wichita, Omaha



Temporary Type in Use



Permanent Type With Cover in Place



Temporary Type, made of Aluminum
Patents Pending

DOES EVAPORATION STEAL 1 TO 8 BBLS. OF GASOLINE

Out of Every Car You Load?

The heaviest gasoline will suffer considerable evaporation loss when loaded through an open dome—while casinghead loss runs as high as 8 barrels per car in warm weather.

Gas-tight loading for ALL gasoline is fast becoming the practice of conservative operators.

A McDONALD Universal Gastite Dome Cover—the most highly perfected product of its kind—quickly pays its cost. Ask for literature and quotations.

"The Home of the Swing Joint"

A. Y. McDONALD MFG. CO.

Dubuque, Iowa

Omaha Minneapolis Des Moines

Complete stocks also carried by:

Butler Mfg. Co., Kansas City
Preferred Utilities Co., 33 W. 60th St. New York
U. S. Flexible Metallic Tubing Co., San Francisco, Seattle, Los Angeles

McDONALD